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Declaration
Selected Remedial Alternative
for the
Cannelton Industries Site

Site Name and Location

Cannelton Industries Site
Sault Ste. Marie
Chippewa County, MI

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Cannelton Industries site, in Sault Ste. Marie, Michigan, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this site. The information supporting this remedial action decision is contained in the administrative record for this site.

Assessment of the site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to pubic health, welfare, or the environment.

Description of the Selected Remedy

The selected remedy is the final remedy for the site. The remedy addresses the threats posed by contaminated soil and sediment, and contaminated groundwater at the site.

The major components of the selected remedy include the following:

- Removal and disposal of debris, waste, soils, and sediments in an on-site Michigan Act 641/RCRA Subtitle D landfill.
- Collection and treatment of groundwater from construction/dewatering activities.
- Groundwater monitoring.
- Land use restrictions for landfilled area.

Declaration of Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. The remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable. However, because treatment of the principal threats of the site was not found to be practicable, this remedy does not satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Valdas V. Adamkus
Regional Administrator

9/30/92
Date

RECORD OF DECISION
CANNELTON INDUSTRIES SITE

SITE NAME, LOCATION AND DESCRIPTION

The Cannelton Industries site is located in the Upper Peninsula of Michigan in Sault Ste. Marie, Chippewa County, in the NE 1/4 of Section 11, Soo Township (T47N, R1W). Figure 1 depicts the location of the site. The Cannelton site is located 1.5 miles west of downtown Sault Ste. Marie along the south shore of the Saint Marys River. The site occupies approximately 75 acres, bounded by the St. Marys River to the north; 4th Avenue and the SOO Railway to the south; 18th Street to the west; and 12th Street to the east. See Figure 2 for a site map with site features marked.

The Cannelton site is physiographically divided into two distinct areas by a small bluff located adjacent to South Street on its south side. This bluff constitutes an elevation change of approximately 12 feet. The lower area, north of South Street, is adjacent to the St. Marys River at an elevation generally less than 610 feet mean sea level. The upper area south of South Street is typically at an elevation ranging from 630 to 640 feet. The lower area is divided further by a smaller bluff, with about 6 feet of relief, which may represent the former St. Marys River shoreline as it existed prior to industrial activity in the area. This smaller bluff is evident across the site and runs basically parallel to South Street and the two-track in the western portion of the site. Most of the area north of this smaller bluff is wetland and is located in the 100-year floodplain, with an elevation of 3-5 feet above average river level, which is 600.2-601.2 feet. The remaining areas of the site are not in the 100-year floodplain.

Other pertinent site features include a small bay located adjacent to the site to the northeast called Tannery Bay. The eastern side of Tannery Bay is formed by a dock, while the southern and western sides are bordered by the site. The peninsula adjacent to Tannery Bay that forms its western shoreline is referred to as Tannery Point and is mostly wetland. Four ponds exist on Tannery Point and are called Dump Pond, Middle Pond, Long Pond, and Beaver Pond.

Approximately 14,689 people live in Sault Ste. Marie. The current land use surrounding the site is residential and light industrial. There are approximately 400 single-family residences located within one-half mile of the site boundary, the majority of which are south and west of the site. The nearest residence is a small apartment building adjacent to the site, directly south of Tannery Bay on South Street. McKinley Elementary School is located 100 feet south of the western portion of the site across 4th Avenue and is attended by approximately 320 students. The nearby residences and the school are connected to the City's municipal water system. The source for Sault Ste. Marie's municipal water is the St. Marys River intake, approximately one mile upstream of the Cannelton site. Sault Ste. Marie, Ontario, also obtains its municipal water

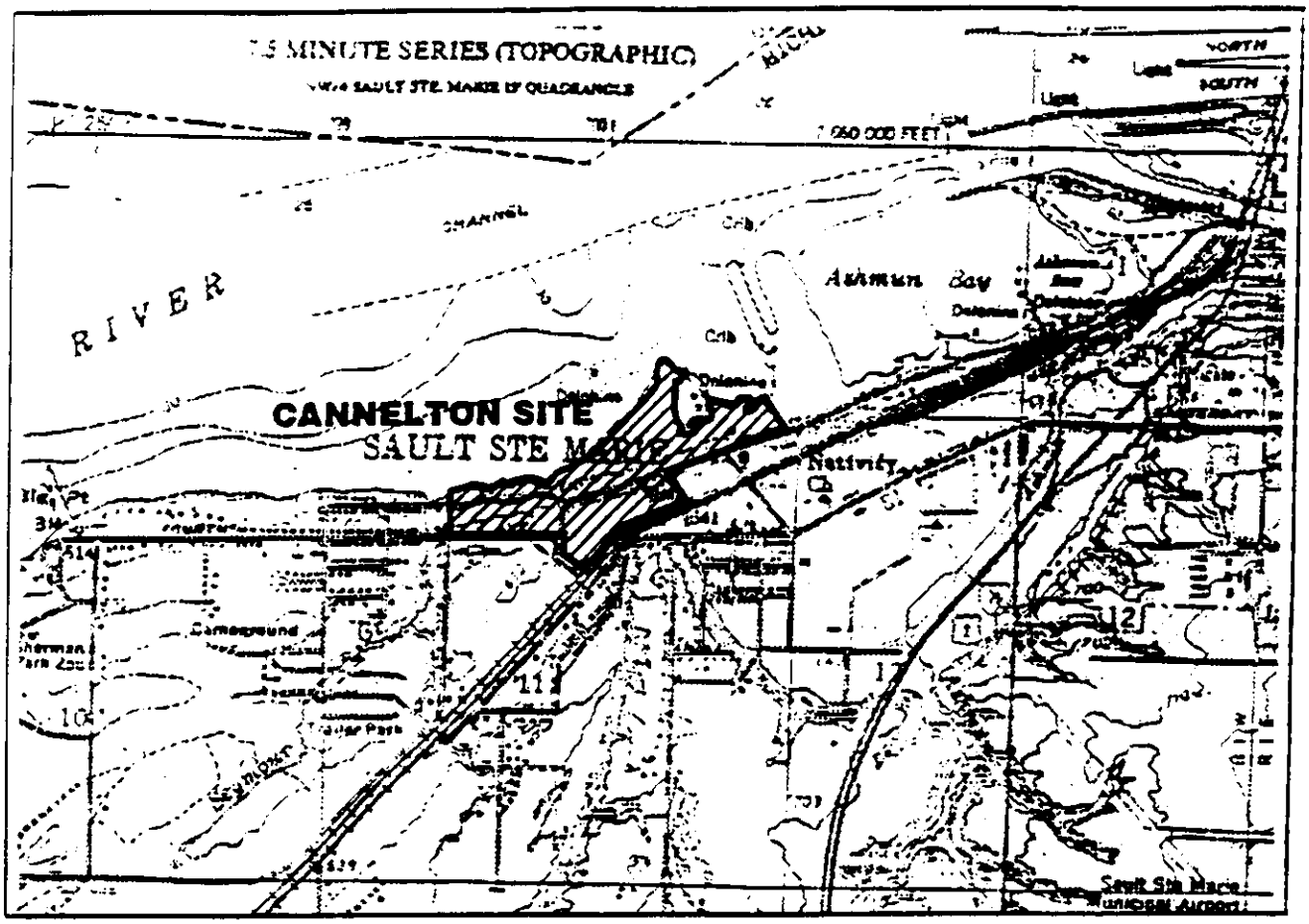

Figure 1.

Site Location Map

Cannelton Industries

Sault St. Marie, Michigan

April, 1991

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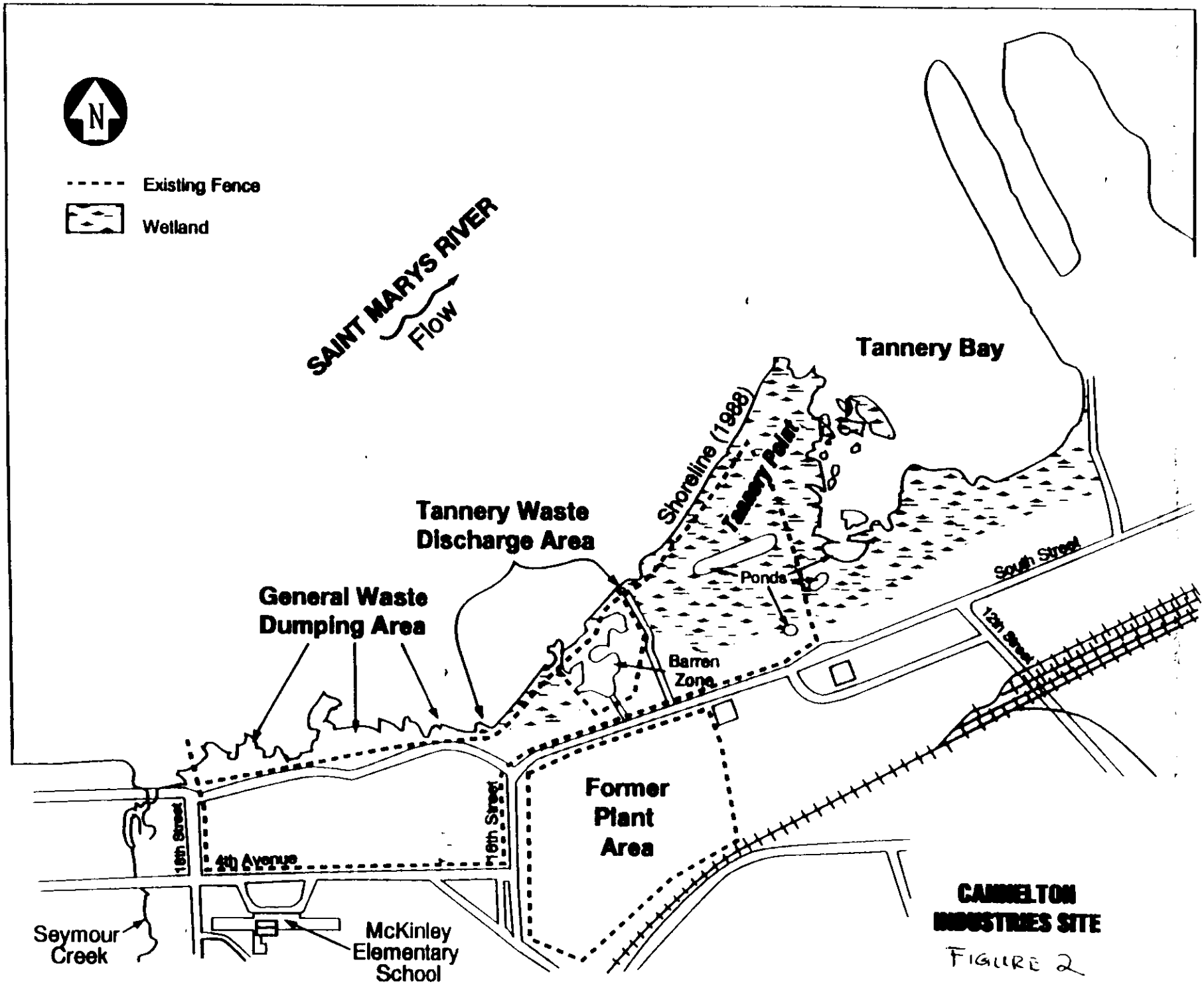
N
Existing Fence
Wetland
SAINT MARYS RIVER
Flow
Tannery Bay
Shoreline (1988)
Tannery Point
Tannery Waste
Discharge Area
General Waste
Dumping Area
Ponds
South Street
12th Street
Barren
Zone
Former
Plant
Area
16th Street
16th Street
4th Avenue
Seymour
Creek
McKinley
Elementary
School
CAMMELTON
INDUSTRIES SITE

FIGURE 2

from the river upstream of the site.

The tannery property is currently zoned for heavy industrial use. The proposed twenty-year City Master Plan designates the majority of the property for general industry, with the exception of the 4th Avenue and 18th Street corner, which has been projected as high density residential.

The St. Marys River connects Lake Superior and Lake Huron via the Soo locks and is the boundary between the United States and Canada. Currently, the St. Marys River is being used as a major navigational channel and a drinking water source for Sault Ste. Marie, Michigan and Sault Ste. Marie, Ontario. Other uses are primarily recreational, such as fishing and boating. The groundwater beneath the site is not currently being used as a drinking water source and is not expected to be used as such in the future. The wetlands and Tannery Bay is currently used by wildlife as habitat. Some recreational use of the bay is probably occurring at present, although this use may be limited to fishing. Tannery Bay is quite shallow so that boating and swimming would be difficult, although wading would be possible.

Significant surface water features occurring at or near the Cannelton site are the St. Marys River; wetlands along the river; Seymour Creek, which enters the St. Marys River approximately 200 feet west of the site; and Ashmun Creek, which enters the river about 0.5 miles east of the site. The St. Marys River is the sole outlet for Lake Superior, the largest fresh-water lake in the world, and forms a connecting channel to Lake Huron, the third largest fresh water lake in the world.

Most of the shore areas at the Cannelton site are wetlands with wetland vegetation, soils, and hydrology. The St. Marys River is the major hydrologic influence on these wetlands. The largest area of wetlands are those located on Tannery Point, comprising approximately 15 acres. These wetlands are primarily forested wetlands and emergent cattail marshes. There are also a number of springs/ponds that provide wetland hydrology. Some water also originates from a sewer that probably services a nearby house located on South Street in the eastern portion of the site.

The activities of two industries, the tannery and a sawmill previously located in the eastern portion of the site, created the potential for the existing physical setting and waste deposition patterns at the site. Tannery Point originated as part of a large pier which extended out into the river. The pier created the western shoreline of Tannery Bay, and it appears that the sawmill filled in much of the western side of the pier with scrap lumber and sawdust. The pier also stopped some of the discharged tannery waste from going downstream and allowed the waste to fill in on the pier's upstream side. This combination of filling activities created what is now called Tannery Point and accounts for the fact

that much of Tannery Point consists of tannery waste as well as sawmill waste material.

Although the entire site has been disturbed by human activity, in most areas these disturbances occurred long ago, and the plant communities have since adapted and the area is well vegetated. While Tannery Point seems to have soils consisting mostly of sawmill and tannery wastes, this area supports dense vegetation and is mostly wetland. Tannery wastes are high in nitrogen and are sold as fertilizer and soil conditioners, which may explain the lushness of the vegetation. The plant communities which exist at the site are diverse and generally of good quality, by wetland standards. The wetlands contain four ponds and variety of other habitat types, making it suitable for many types of small wildlife and birds. Several species have been observed at the site, including white-tailed deer, beaver, ground hog, green heron, wood thrush, mallards and Canada goose. There are no known occurrences of Federal- or State-listed endangered, threatened, or otherwise significant species, natural plant communities, or natural features at the Cannelton site.

There are two aquifers which are hydraulically connected beneath the site. The shallow aquifer consists of glacial deposits and is primarily characterized as silty sand, but there are also site-wide variations such as a linear deposit of gravels and cobbles, a fairly continuous layer of sand and gravel above the bedrock and a thin layer of clay serving as a discontinuous confining layer in some of the deeper wells along the river. The bedrock underlying the unconsolidated deposits, the Jacobsville Sandstone, has considerable topography at the site. There is a buried bluff in the bedrock located near South Street, which causes the depth to bedrock to vary from approximately 30 feet south of South Street to approximately 60 feet near the river. In spite of this, there is a continuous aquifer connecting the upper and lower areas of the site and the St. Marys River. The depth to the water table ranges from approximately 8 feet to 23 feet in the plant area and 1 foot to 7 feet in the area north of South Street.

The site-wide groundwater gradient is towards the St. Marys River. Vertical gradients are downward in the southern portion of the site, indicating a recharge zone, and upward in the northern portion, indicating discharge to the river. The average groundwater velocity for the site was calculated to be 0.19 ft/day or 70 ft/year. The velocity may vary based on the different soil types found across the site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Cannelton Industries site is the location of a former tannery called the Northwestern Leather Company. During its period of operations, roughly 1900 to 1958, the tannery processed primarily cowhides using a sophisticated and multi-step process which

transformed raw animal hides to a finished leather. The plant had no sewage system other than three drains, which included pipes and open ditches, running to the shores of the St. Marys River to what is referred to as the waste discharge zone. According to historical records and interviews with former employees, no liquid waste was discharged to the east, west or south of the plant. During busy times of operation, the plant might discharge up to 132 chemical vats per day, or approximately 250,000 gal/day, through the drainage system. Historical aerial photographs indicate that waste was discharged directly to the St. Marys River and adjacent wetlands.

A second area along the St. Marys River, located at the west end of the site, was used as a dump site for barrels and "general" wastes from the tannery. According to former employees of the tannery, up to two truck loads of plant wastes were disposed of per day. These wastes were typically burned after disposal.

The known and expected wastes discharged from the tannery in the area adjacent to the river included metals , cyanide, sulfide, calcium carbonate, salts discharged as brine solutions, and various leather finishing solutions such as shellacs, thinners, formic and carbolic acids, formaldehyde, ammonia, octoalcohol and other alcohols. Chromium is the primary metal known to be disposed. Tannery waste has been exempted as a listed hazardous waste under the Resource Conservation and Recovery Act (RCRA).

The primary tannery waste discharge area covers a 4-acre area north of South Street and includes an irregularly shaped area of approximately one acre which is partially devoid of vegetation and contains multi-colored soils and tannery waste residues. This area is referred to as the "barren zone". The barren zone was likely the location where solid waste byproducts of the tanning process were dumped. Spontaneous fires have reportedly occurred in this area in the past.

Aerial photographs indicate that some of the tannery waste deposited on the St. Marys shoreline has eroded over time. Both this eroded material and material dumped into the river during the plant's operation were likely carried by the river downstream and deposited both along the shoreline of Tannery Point and in the low-energy water found downstream in Tannery Bay.

The 75 acre property was once owned by the now defunct tannery, Northwestern Leather Company (Northwestern). The plant was located in northern Michigan due to the location of the hemlock forests, hemlock bark being a major source of tanning extract. The tannery operated from 1900 until 1958, going out of business for a number of reasons. The tannery was destroyed by fire in 1958.

In 1955, Fiborn Limestone Company (Fiborn), a subsidiary of the Algoma Steel Corporation (Algoma), purchased a portion of the site,

granting an easement to Northwestern for the tannery drains. Following the tannery closing in 1958, Fiborn acquired the remainder of the site from Northwestern. The property was then transferred to Cannelton Coal Company, which became Cannelton Industries, Inc., a wholly owned subsidiary of Algoma. The property was to be used by Algoma for a fabricating plant for steel pipe, a project which was never realized. The last of the buildings were torn down by Algoma in the 1970's and at present only scattered debris and concrete foundations remain in the plant area. In 1991, AMAX Coal Industries, Inc., of Indianapolis, Indiana, purchased Cannelton Holding Company, which owns Cannelton Industries, Inc.

Prior to the Remedial Investigation (RI), environmental sampling at the Cannelton site from 1978 through 1988 had partially delineated the nature of contamination. Sampling was performed by the Michigan Department of Natural Resources (MDNR) in 1978, 1979 and 1980, and by the property owner periodically from 1979 to 1986. In 1987, the United States Geological Survey (USGS) installed a monitoring well at the Cannelton site. The majority of the historical sampling performed on-site had been limited to the area in or adjacent to the barren zone. A minimal amount of ground water, surface water, and sediment sampling had also been performed.

The sampling prior to the remedial investigation suggested soil samples from the barren zone were contaminated with cadmium, chromium, copper, nickel, lead, zinc, arsenic, and cyanide. River sediments adjacent to the site contained many of the same compounds. Limited ground water sampling indicated the presence of cyanide, chromium, lead, manganese, and iron. The surface water sampling and analyses conducted prior to the RI did not indicate extensive contamination of the surface water. Historical detections were few and generally unverified.

U.S. EPA's removal program has been involved at the site on three different occasions. In June 1988 the Sault Ste. Marie Fire Department contacted the MDNR, who in turn called the U.S. EPA Emergency Response Section, due to recurring fires at the Cannelton site. The fires, which were located within the barren zone, reportedly occurred spontaneously during the dry summer months and had been increasing in intensity. U.S. EPA responded to the request and excavated five trenches within the barren zone, in order to delineate the source of the fires, reduce methane build-up from biological activity, and to disperse heat build-up within the soils. The excavations did not reveal a readily apparent source for the fires. At that time the property owners fenced and padlocked the barren zone area.

In May 1989, the U.S. EPA removal program issued a Unilateral Administrative Order (UAO) to the Potentially Responsible Parties (PRPs), who were the property owners, Cannelton Industries, Inc.

and its parent company, Algoma Steel Corporation. The UAO directed the PRPs to install a sprinkler system to help reduce the incidence of fires, to further investigate the cause of the fires, and to construct a shoreline stabilization system in front of the barren zone to prevent waste materials from eroding into the river. The sprinkler system was installed immediately, and rip-rap was installed along the shoreline in front of the barren zone in November 1989. The investigation did not determine the cause of the fires.

In September 1991, Cannelton Industries, Inc. entered into an Administrative Order on Consent (AOC) with U.S. EPA under the authority of the removal program. This AOC required the PRPs to fence a larger area of the site to prevent access to contaminated areas and to extend the shoreline stabilization both to the east and west of the existing rip-rap to protect other shoreline areas from erosion. This work was conducted from September to November of 1991.

In June 1988, U.S. EPA proposed that the Cannelton Industries site be added to the National Priorities List (NPL). Also that month, U.S. EPA issued Special Notice Letters to Cannelton Industries and Algoma Steel Corporation, requesting that they conduct a Remedial Investigation and Feasibility Study (RI/FS) at the site. Since no settlement with the Companies was reached, U.S. EPA funded the RI/FS and issued a work assignment in September 1988 under the ARCS contract to WW Engineering & Science to conduct the RI/FS. The site was added to the NPL on August 30, 1990 (55 Federal Register 35501-35525).

Field work for the RI/FS took place over the period from June 1989 to October 1990. Samples were collected during two sampling phases: phase one field work occurred from June to December 1989, while phase two field work occurred in October 1990. Sediment samples were collected from 57 locations during Phase I and II. Surface water samples were collected only during Phase I from 17 locations. Soil samples were collected from 78 locations during Phase I and 16 locations during Phase II. Soil samples were also collected off-site at 5 residential properties and one sample from the school yard during Phase I. Sixty-two monitoring wells were installed with each well sampled twice during the Phase I investigation. Samples were analyzed according to the approved Quality Assurance Project Plan (QAPP) for inorganic and organic compounds on the Target Analyte List (TAL) and the Target Compound List (TCL). Sediment toxicity, groundwater toxicity and benthic macroinvertebrate studies were also conducted.

Additional field work was conducted by U.S. EPA's Environmental Response Team (ERT), Edison, New Jersey, in October 1991 and May 1992. The first study involved additional sediment and soil toxicity tests and benthic macroinvertebrate studies. The May 1992 field work consisted of a habitat survey of the wetlands on site

and some preliminary mapping of the extent of tannery waste in Tannery Bay. Reports for each of these studies were prepared by ERT.

In preparation for the FS, two bench-scale treatability studies were conducted on soils/wastes and sediments from the site. These treatability studies evaluated stabilization and soil flushing as two potential technologies for treating the contaminants at the site.

The RI Report was published in September 1991. A Baseline Risk Assessment, bound under separate cover, was completed in October 1991. The FS was published for public review and comment in April 1992 and contained six remedial alternatives. A FS Addendum, which added an alternative to be considered for the site, was completed in July 1992.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

A community relations plan was developed in 1989 to document community concerns and to plan an information strategy. U.S. EPA has held three public meetings to keep the public informed about the activities at the site. U.S. EPA has also sent out fact sheets at various times during the RI/FS process.

As part of its community relations program, U.S. EPA has maintained an information repository at the Bayliss Public Library, 541 Library Drive, Sault Ste. Marie, Michigan. Documents and reports regarding the Cannelton Industries site prepared by U.S. EPA and the MDNR are contained in this repository.

U.S. EPA notified the local community, by way of the Proposed Plan, of the recommendation of a remedial alternative for the Cannelton Industries site. To encourage public participation in the selection of a remedial alternative, U.S. EPA scheduled a public comment period from July 15 through August 13, 1992. Based on requests from the MDNR and community members, the public comment period was extended an additional 30 days to September 14, 1992. On July 28, 1992, U.S. EPA held a public meeting to discuss the recommended remedial alternative and the other alternatives identified and evaluated in the FS. A transcript of the meeting is included as part of the Administrative Record for the Cannelton Industries site. U.S. EPA's responses to comments received during this public meeting and to written comments received during the public comment period are included in the Responsiveness Summary which is attached to this ROD.

Press releases were sent to Sault Ste. Marie, Michigan media, and advertisements were placed in the Sault Evening News concerning the public meetings, the comment period, and the extension to the comment period.

The public participation requirements of CERCLA Sections 113(k)(2)(B)(i-v) and 117 were met in the remedy selection process.

SCOPE AND ROLE OF RESPONSE ACTION

The remedial action will address risks to people due to ingestion of and dermal contact with soils and waste material, inhalation of dust from the site, and ingestion of groundwater beneath the site. Another goal of the cleanup is to address impacts to the surface water due to groundwater discharge or resuspension of contaminated sediments, and to minimize the effect of contaminants on such aspects of the environment as benthic (bottom-dwelling) organisms in the river, the on-site wetlands, and fish, bird and terrestrial populations. Included in the evaluation of overall environmental threat was the relative impact to the environment due to excavation or dredging as well as contaminants.

This remedial action is expected to be the final action for the site. All media (groundwater, surface water, air, soil, sediment) at the site are addressed by the selected remedy. The main component of the remedy includes excavation, consolidation and on-site containment of debris, wastes and soils and sediment contaminated above clean-up criteria. Groundwater and surface water would be addressed by removal of the source material and would be monitored. Additional monitoring of the environment would be conducted to ensure protection. Land-use restrictions in the containment area and restrictions on groundwater use would also be sought. The selected remedy is described in more detail in the section titled "Selected Remedy".

No principal threat which warrants treatment at the site has been identified. While the waste at the site does not readily fit the definition of a principal threat, it also cannot be classified on the whole as a low level threat. Treatment options were evaluated for the source material (soils, wastes and sediments), and two bench-scale treatability studies were conducted. It was determined that no added benefit would be derived from treating the source material using any one of the three technologies evaluated, making treatment impracticable. It was also determined that, given the waste characteristics, chiefly the low mobility of the principal contaminants, containment of the source material would be a safe and reliable option when coupled with institutional controls and monitoring.

SUMMARY OF SITE CHARACTERISTICS

The source of contamination at the site was the discharge to the river and shoreline of primarily liquid tannery waste through the drains from the plant and the dumping of solid tannery waste and debris along the river shoreline. This release created the present accumulation of waste and contaminated soils and sediments, which is a continuing source of actual and potential contamination to the

groundwater, surface water and air.

The primary contaminants found at the site are metals. The concentrations of inorganic compounds in soils and sediments at the Cannelton site closely follow the historical land use and the currents in the St. Marys River. The highest values are associated with the former tannery drains and discharge areas, while elevated levels of metals are also present in the soils along the western shoreline of the site where general refuse was dumped, in the former plant area, and along the shoreline east of the main discharge area and in the adjacent wetlands. Based upon their distribution within the soils and sediments, the following inorganic compounds were found to be elevated at the site due to former tannery practices: chromium, arsenic, lead, mercury, barium, and cadmium. Chromium is the most wide-spread inorganic contaminant in the soils and sediments at the site. Following are the maximum concentrations (in mg/kg) detected in soils and sediments of each of the above-listed metals:

	SOILS	SEDIMENTS
Arsenic	3,600	29.6
Barium	10,300	202
Cadmium	341	26.1
Chromium	328,000	40,000
Lead	10,100	603
Mercury	25	2.3

Both the EP Toxicity test and the Toxicity Characteristic Leaching Procedure (TCLP) analysis were performed on samples of site soils, wastes and sediments. The results of these tests indicate that the site soils, wastes and sediments are not classified as RCRA characteristic hazardous waste.

The analysis for organic compounds in soils and sediments indicate a sporadic distribution of volatile, semi-volatile, pesticide and poly-chlorinated biphenyl (PCB) compounds. Several polynuclear aromatic hydrocarbon (PAH) compounds are found at the site. These are more prevalent at the surface and may be due to historical fires at the site in the barren zone, the plant area and the western dump area. Total concentrations of carcinogenic PAHs in the 0-2 foot depth ranged up to 16.7 mg/kg.

The groundwater at the Cannelton site is not widely impacted from the former tannery operations. In the tannery waste discharge area the ground water is impacted only at one well, MW45, with arsenic (31,600 µg/L), cadmium (30.2 µg/L) and chromium (79.5 µg/L) from the tannery wastes. The arsenic and cadmium concentrations exceed the Maximum Contaminant Levels (MCLs) of 50µg/L and 5µg/L, respectively. The site-wide elevated levels of iron and magnesium, and localized elevated levels of lead are believed to be consistent with background conditions. Elevated aluminum concentrations may be associated with the tannery waste, although aluminum was also

encountered in upgradient monitoring wells. Vanadium, detected in only a few samples, and above Michigan Act 307 standards at MW36 (111 µg/L), could be related to the former tannery.

Volatile and semi-volatile organic compounds are not found consistently within the ground water at the site. Tetrachloroethene was detected at 7 µg/L (MCL = 5 µg/L) in one well, but was only detected in two other wells on site at lower levels.

The surface water was not found to be highly impacted. Chromium was detected in some samples of river water and pond water above water quality criteria, with the range of detected concentrations being 1.1 µg/L - 485 µg/L. An analysis for hexavalent chromium was performed, but it was not detected in the surface water at a detection limit of 10 µg/L.

Much of the chromium at the site is present in tannery wastes, which significantly affects the mobility of chromium at the site. Trivalent chromium is used in tanning because it forms very stable coordination complexes that can bind and cross-link hide protein fibers (collagen tissue) in leather. The waste material consists partially of leather which was treated with chromium in the tanning process, as well as other organic material which would also bind up chromium. Leachate tests (both EP toxicity and TCLP) were conducted on tannery wastes and other soils and sediments as part of the remedial investigation. The results of the leachate tests indicated that the wastes, soils and sediments have low potential for leaching and are not characteristically hazardous with respect to chromium or other metals. In addition, the groundwater data show that chromium was detected above the quantification limit (which is 5 times the maximum field blank contamination; for chromium the limit is 33 ppb) in only three wells out of 65 at the site. At 21 wells sampled, concentrations of chromium were low enough to be below the quantification limit, making it uncertain whether the detection was significant or not. None of the chromium detections were above the MCL or Act 307 Type B (health-based) standard. These results suggest that there is little potential for chromium to leach from waste materials at the site.

Estimates of contaminated material depend on the criteria used to differentiate contaminated from non-contaminated material. If background concentrations for metals are used, the volume and weight of impacted soils and sediments are approximately 406,500 cubic yards or 605,500 tons. If specifically human health-based criteria are used (1×10^{-6} or a hazard index of 1 for ingestion, dermal contact or inhalation), the volume and weight of impacted soils and sediments are approximately 199,700 cubic yards or 290,600 tons.

The soil boring and well logs indicate that almost all parts of the

site are covered by some fill. The fill consists of materials such as scrap leather, leather waste, hair, cinders, bricks, concrete, scrap wood, scrap metal, glass and cans. The most extensive fill occurs between South Street and the river: along the river in the west part of the site; and in the barren zone. Relatively little fill occurs in the west part of the site south of the two-track along the river; the east part of the site south of South Street; and in the far east part of the site. River sediments adjacent to and downstream from the tannery waste discharge area contain both tannery waste and lumber scraps. The thickest accumulation of tannery waste (up to five feet) in the sediments occurs in Tannery Bay where the river currents deposited suspended tannery waste.

Generally speaking, contaminated areas correlate relatively well with filling performed by the tannery operations, but with varying levels of contaminant concentrations. The vertical extent of contamination does not appear to go deeper than 10 feet below the ground surface, and in most cases it is shallower. Contaminated material does extend below the water table, particularly in the area north of South Street.

The environmental transport media at the Cannelton site are air, surface water, and ground water. Site-related sediments and any absorbed chemicals of potential concern could be transported downstream from the site by the flow of the St. Marys River. From aerial photographs, one pattern of sediment deposition can be identified in which sediments and shoreline debris from the site are transported downstream and into Tannery Bay. Surface water could become contaminated by resuspension of sediment or erosion of contaminated site soils and waste. Erosion of site soils/wastes could further contaminate sediments as material is transported and deposited downstream.

The leaching of water through contaminated soils and wastes and into ground water may result in the transfer of chemicals of potential concern from the soils and wastes into ground water and then into surface water. Leaching of contaminants from sediments may similarly affect surface water. This transfer depends on several physical and chemicals characteristics of both the chemicals and the soils/wastes or sediments. Sampling and analyses of ground water and surface water at the tannery site indicate that extensive leaching is not occurring at present.

Air may transfer chemicals of potential concern any distance from the site. Chemicals may volatilize or wind may disrupt surface soils resulting in fugitive dust emissions.

Potential receptors could be residents in the area or adjacent to the site, elementary school children, and recreational users of the property. However, the potential for exposure, with the exception of the air pathway, has been reduced due to the fence now enclosing most contaminated areas.

As for natural resource receptors, the site is located on the shore of the St. Marys River, which is an important navigational waterway as well as an Area of Concern as designated by the International Joint Commission. Possible targets in the river would be fish and benthic organisms. A large portion of the site north of South Street has been identified as wetlands. This area includes Tannery Point as well as areas east of Tannery Point along the southern shore of Tannery Bay. Possible targets in the wetlands would be plants, birds, amphibians and a variety of mammals.

SUMMARY OF SITE RISKS

In order to characterize the current and potential threats to human health and the environment that may be posed by the contaminants at the site, a Baseline Risk Assessment (RA) was prepared according to U.S. EPA's Risk Assessment Guidance for Superfund (RAGS): Volume 1 - Human Health Evaluation Manual (Part A) and RAGS: Volume 2 - Environmental Evaluation Manual.

In order to calculate risks to human health and the environment posed by the Cannelton Industries site, chemicals of potential concern were identified. Chemicals of potential concern are defined as chemicals that are potentially site-related and whose data are of sufficient quality for use in the quantitative risk assessment. Chemicals of potential concern were identified based on sampling of soil, ground water, surface water, and sediments at the site and at background locations. The site history, analytical methods, quantitation limits, data qualifiers, concentrations in blanks, and background concentrations were evaluated as described in RAGS. A summary of chemicals of potential concern based on this evaluation is presented in Table 1. This is the same as Table 2-9 of the Baseline Risk Assessment.

As can be seen in the table, the site was divided into seven areas for evaluation: disposal and plant area soils, other soils at the property, groundwater under the site, surface water of the St. Marys River, surface water in four on-site ponds, sediments along the property shoreline in the St. Marys River and Tannery Bay, and sediments in four on-site ponds. An eighth area which is evaluated is air. No air samples were collected during the RI, therefore the potential risks due to this media are modelled.

After evaluating the contaminated media and migration pathways present at the site, several current and future populations which could be exposed to the contaminants at the site were identified. Current populations are: adjacent residential adults and children and on-site recreational adults and children. Future populations are: on-site residential adults and children, on-site recreational adults and children and occupational adults if a business was built on-site.

Routes by which a person could be exposed to contamination were

Table
Summary of Concentration Ranges of Chemicals of Potential Concern

Chemical	Disposal and Plant Area (mg/kg)	Other Soil (mg/kg)	Ground Water (mg/l)	River Surface Water (mg/l)	Pond Surface Water (mg/l)	River Sediment (mg/kg)	Pond Sediment (mg/kg)
Tetrachloroethene	0.002 - 0.026	0.002 - 0.002	0.002 - 0.007	- - -	0.002 - 0.003	- - -	not analyzed
Trichloroethene	0.002 - 0.027	- - -	- - -	- - -	0.0006 - 0.0006	- - -	not analyzed
Toluene	- - -	- - -	- - -	- - -	- - -	0.003 - 0.017	not analyzed
1,1,1-Trichloroethane	- - -	- - -	- - -	- - -	0.0007 - 0.0007	- - -	not analyzed
Xylene (total)	0.002 - 0.04	- - -	- - -	- - -	- - -	- - -	not analyzed
Acenaphthylene	0.054 - 7.8	0.057 - 0.057	- - -	- - -	- - -	- - -	not analyzed
Anthracene	0.051 - 22	0.039 - 0.039	- - -	- - -	- - -	- - -	not analyzed
Benzo(a)Anthracene	0.078 - 56	0.1 - 0.12	- - -	- - -	- - -	- - -	not analyzed
Benzo(a)Pyrene	0.061 - 78	0.13 - 0.18	- - -	- - -	- - -	- - -	not analyzed
Benzo(b)Fluoranthene	0.092 - 46	0.32 - 0.38	- - -	- - -	- - -	- - -	not analyzed
Benzo(g,h,i)Perylene	0.11 - 42	0.04 - 0.066	- - -	- - -	- - -	- - -	not analyzed
Benzo(k)Fluoranthene	0.098 - 35	0.13 - 0.17	- - -	- - -	- - -	- - -	not analyzed
Benzoic Acid	- - -	0.16 - 0.16	- - -	- - -	- - -	- - -	not analyzed
Benzyl Alcohol	- - -	- - -	- - -	- - -	0.006 - 0.006	- - -	not analyzed
bis(2-Ethylhexyl)Phthalate	- - -	- - -	0.001 - 0.018	- - -	0.002 - 0.002	- - -	not analyzed
Chrysene	0.095 - 70	0.16 - 0.19	- - -	- - -	- - -	- - -	not analyzed
Dibenz(a,h)Anthracene	0.34 - 21	- - -	- - -	- - -	- - -	- - -	not analyzed
Dibenzofuran	0.07 - 3.9	0.081 - 0.081	- - -	- - -	- - -	- - -	not analyzed
Di-n-Butylphthalate	- - -	0.24 - 0.24	- - -	0.001 - 0.001	0.002 - 0.002	- - -	not analyzed
Fluoranthene	0.046 - 95	0.28 - 0.33	- - -	- - -	- - -	- - -	not analyzed
Fluorene	0.11 - 12	- - -	- - -	- - -	- - -	- - -	not analyzed
Indeno(1,2,3-cd)Pyrene	0.078 - 38	0.047 - 0.074	- - -	- - -	- - -	- - -	not analyzed
2-Methylnaphthalene	0.068 - 8.8	0.21 - 0.21	- - -	- - -	- - -	- - -	not analyzed
3-Methylphenol	1.4 - 1.4	- - -	- - -	- - -	- - -	- - -	not analyzed
4-Methylphenol	- - -	- - -	- - -	- - -	- - -	0.11 - 0.37	not analyzed
Naphthalene	0.052 - 10	0.18 - 0.18	- - -	- - -	- - -	- - -	not analyzed
Phenanthrene	0.043 - 100	0.14 - 0.26	- - -	- - -	- - -	- - -	not analyzed
Phenol	- - -	- - -	0.001 - 0.079	- - -	- - -	- - -	not analyzed
Pyrene	0.022 - 130	0.21 - 0.25	- - -	- - -	- - -	- - -	not analyzed
2,4,5-Trichlorophenol	0.24 - 35	- - -	- - -	- - -	- - -	- - -	not analyzed

Table

Summary of Concentration Ranges of Chemicals of Potential Concern

Chemical	Disposal and Plant Area (mg/kg)	Other Soil (mg/kg)	Ground Water (mg/l)	River Surface Water (mg/l)	Pond Surface Water (mg/l)	River Sediment (mg/kg)	Pond Sediment (mg/kg)
Aluminum	450 - 13000	- - -	- - -	- - -	- - -	497 - 6170	- - -
Antimony	4.5 - 1860	- - -	- - -	- - -	0.006 - 0.006	7.5 - 149	62 - 62
Arsenic	0.79 - 3600	9.3 - 23	0.0251 - 31.6	- - -	- - -	0.54 - 29.8	0.69 - 9.8
Barium	6.5 - 10300	247 - 350	0.0663 - 0.374	0.0117 - 0.0291	0.0497 - 0.0881	15 - 202	- - -
Cadmium	0.5 - 341	- - -	0.0156 - 0.0302	- - -	- - -	- - -	- - -
Calcium	2200 - 227000	23600 - 23600	4.56 - 240	13.1 - 19.7	33.2 - 43.8	2370 - 17700	- - -
Chromium, total	9.1 - 328000	120 - 120	0.0333 - 0.0795	0.0011 - 0.485	0.0033 - 0.0283	2.2 - 31000	34.8 - 6210
Chromium, VI	120 - 15000	not analyzed	not analyzed	- - -	- - -	22 - 2700	440 - 440
Cobalt	0.9 - 62	- - -	0.0033 - 0.0075	- - -	0.0063 - 0.0063	- - -	- - -
Copper	1.1 - 657	- - -	- - -	- - -	0.0069 - 0.0069	12.4 - 82	- - -
Cyanide	0.45 - 4.9	0.94 - 1.2	- - -	- - -	- - -	- - -	3.3 - 7.2
Iron	749 - 239000	- - -	12.1 - 47.3	- - -	- - -	934 - 13700	- - -
Lead	1.6 - 10100	9.3 - 266	- - -	0.003 - 0.012	- - -	3.5 - 603	30.8 - 1220
Magnesium	120 - 22300	- - -	1.51 - 134	2.63 - 3.82	9.93 - 16.1	- - -	- - -
Manganese	15 - 1230	33.1 - 866	0.0504 - 3.62	- - -	- - -	8 - 280	- - -
Mercury	0.04 - 25	0.5 - 0.5	- - -	- - -	- - -	0.11 - 1.9	- - -
Nickel	2.9 - 111	- - -	- - -	- - -	- - -	- - -	- - -
Potassium	115 - 1300	342 - 1040	0.917 - 37.3	- - -	1.93 - 2.77	82.3 - 756	197 - 968
Selenium	0.67 - 110	- - -	- - -	- - -	0.0037 - 0.0037	- - -	- - -
Silicon	270 - 410	not analyzed	not analyzed	not analyzed	not analyzed	not analyzed	not analyzed
Silver	0.92 - 32.8	- - -	- - -	- - -	- - -	- - -	- - -
Sodium	- - -	- - -	4.7 - 732	- - -	18.9 - 23.3	81.9 - 448	- - -
Strontium	6.3 - 18	not analyzed	not analyzed	0.0216 - 0.0396	0.145 - 0.288	not analyzed	not analyzed
Thallium	0.33 - 22	- - -	- - -	- - -	- - -	0.25 - 0.59	0.36 - 1.5
Vanadium	2.3 - 163	5.6 - 45.3	0.0223 - 0.111	- - -	0.0053 - 0.0056	2.1 - 41.5	- - -
Zinc	4.2 - 4950	- - -	- - -	- - -	- - -	4.8 - 252	6.8 - 60.6
Acetone	0.11 - 9.2	- - -	- - -	- - -	- - -	0.14 - 0.14	not analyzed
2-Butanone	0.001 - 15	- - -	- - -	- - -	- - -	0.009 - 0.012	not analyzed
Chlorobenzene	0.002 - 0.072	- - -	- - -	- - -	- - -	- - -	not analyzed
Methylene Chloride	0.12 - 22	- - -	- - -	- - -	- - -	- - -	not analyzed

Table

Summary of Concentration Ranges of Chemicals of Potential Concern

Chemical	Disposal and Plant Area (mg/kg)	Other Soil (mg/kg)	Ground Water (mg/l)	River Surface Water (mg/l)	Pond Surface Water (mg/l)	River Sediment (mg/kg)	Pond Sediment (mg/kg)
alpha-Chlordane	0.11 - 0.11	- - -	- - -	- - -	- - -	- - -	not analyzed
gamma-Chlordane	0.0021 - 0.11	- - -	- - -	- - -	- - -	- - -	not analyzed
4,4'-DDD	0.0092 - 0.17	- - -	- - -	- - -	- - -	- - -	not analyzed
4,4'-DDE	0.0065 - 0.2	- - -	- - -	- - -	- - -	- - -	not analyzed
4,4'-DDT	0.002 - 0.25	- - -	- - -	- - -	- - -	- - -	not analyzed
Aroclor-1254	0.027 - 2.8	- - -	- - -	- - -	- - -	- - -	not analyzed
Aroclor-1260	0.62 - 0.65	- - -	- - -	- - -	- - -	- - -	not analyzed

- - - = not detected or not detected in blanks.

also identified. These are:

I. Ingestion of or dermal contact with soil
II. Ingestion of groundwater
III. Dermal contact with and/or inhalation of groundwater through showering
IV. Inhalation of vapor or particulates at site, workplace or residences
V. Ingestion of or dermal contact with surface water or sediments

Each route of exposure was evaluated for each population with a few exceptions: current residential and recreational populations were not evaluated for the groundwater ingestion scenario because there are no drinking water wells currently on-site, only the future residential population was evaluated for the showering scenario, and the future occupational population was not evaluated for ingestion or dermal contact with surface water or sediments.

For each exposure pathway evaluated, carcinogenic and noncarcinogenic health risks were characterized for the reasonable maximum exposure risk scenario. Exposure assumptions made for each pathway can be found in Table 3-11 of the RA. In general, the standard and default exposure assumptions recommended by U.S. EPA guidance were used, as well as conservative estimates and best professional judgement. In general, residential and recreational exposure assumed 350 days/year for soil ingestion and dermal contact scenarios, groundwater scenarios and the inhalation scenario. Occupational exposure was assumed to be 250 days/year. Exposure to surface water and sediments while swimming or wading was assumed to be 7 days/year.

Intake equations from RAGS Volume 1 and the exposure assumptions were used to estimate potential chemical intakes by the various populations.

The toxicity assessment identified the available and appropriate toxicity values for each chemical of potential concern, including chronic and sub-chronic reference doses and slope factors. The IRIS database, Health Effects Assessment Summary Tables, and the U.S. EPA Environmental Criteria and Assessment Office (ECAO), were consulted for information. Inadequate carcinogenic and/or non-carcinogenic toxicity information was available for several chemicals of potential concern. The possible health effects of these chemicals and consequences of their exclusion from the risk assessment are unknown.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals.

Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposure within a single medium or across media. Any Hazard Index value greater than 1.0 suggests that a non-carcinogen potentially presents an unacceptable health risk.

Table 2 provides a summary of hazard indices for all exposure routes and exposed populations evaluated.

Slope factors have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. Slope factors, which are expressed in units of $(mg/kg/day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen (in mg/kg/day), to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the slope factor. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Cancer risks are determined by multiplying the intake level with the slope factor for each contaminant of concern. These risks are probabilities that are generally expressed in scientific notation (e.g. $1x10^{-6}$). A cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the site. The U.S. EPA generally attempts to reduce the cancer risk posed by a Superfund site to a range of $1x10^{-4}$ to $1x10^{-6}$, with $1x10^{-6}$ as the starting point.

Table 3 provides a summary of cancer risks for all exposure routes

TABLE 2
SUMMARY OF HAZARD INDICES FOR ALL EXPOSURE ROUTES AND EXPOSED POPULATIONS

Environmental Areas	Current					Future				
	Occupational	Residential		Recreational		Occupational	Residential		Recreational	
	Adult	Child	Adult	Child	Adult	Adult	Child	Adult	Child	Adult
Disposal and Plant Area Soil	ne	2.4 E+1	2.7 E+1	1.0 E+1	1.4 E+1	7.1 E+0	3.8 E+1	4.1 E+1	9.7 E+0	1.4 E+1
Other Site Soil	ne	3.1 E-1	1.2 E-1	1.3 E-1	6.5 E-2	1.2 E-2	1.8 E-1	6.6 E-2	4.6 E-2	2.4 E-2
Ground Water	ne	ne	ne	ne	ne	1.2 E+2	2.1 E+3	9.0 E+2	1.3 E+2	5.6 E+1
St. Marys River Surface Water	ne	5.3 E-3	6.3 E-3	5.3 E-3	6.3 E-3	ne	5.3 E-3	6.3 E-3	5.3 E-3	6.3 E-3
Pond Surface Water	ne	9.0 E-2	3.0 E-2	9.0 E-2	3.0 E-2	ne	9.0 E-2	3.0 E-2	9.0 E-2	3.0 E-2
St. Marys River Sediment	ne	1.1 E-2	1.6 E-2	1.4 E-2	1.7 E-2	ne	1.1 E-2	1.6 E-2	1.4 E-2	1.7 E-2
Pond Sediment	ne	1.2 E-2	9.7 E-3	1.4 E-2	1.0 E-2	ne	1.2 E-2	9.7 E-3	1.4 E-2	1.0 E-2
Ambient Air	ne	4.8 E+2	6.1 E+2	4.7 E+3	1.2 E+4	2.3 E+4	7.5 E+4	9.5 E+4	4.7 E+3	1.2 E+4
Total:	ne	5.1 E+2	6.4 E+2	4.7 E+3	1.2 E+4	2.3 E+4	7.7 E+4	9.6 E+4	4.8 E+3	1.2 E+4

Shaded values exceed a hazard index of one.
ne = no exposure

TABLE 3
SUMMARY OF CARCINOGENIC RISKS FOR ALL EXPOSURE ROUTES AND EXPOSED POPULATIONS

Environmental Areas	Current					Future				
	Occupational	Residential		Recreational		Occupational	Residential		Recreational	
	Adult	Child	Adult	Child	Adult	Adult	Child	Adult	Child	Adult
Disposal and Plant Area Soil	ne	3.2 E-4	1.1 E-3	4.2 E-4	1.1 E-3	4.1 E-4	1.1 E-3	1.8 E-3	6.2 E-4	1.6 E-3
Other Site Soil	ne	3.6 E-5	1.2 E-4	4.3 E-5	1.1 E-4	2.2 E-5	5.3 E-5	1.0 E-4	3.5 E-5	8.9 E-5
Ground Water	ne	ne	ne	ne	ne	1.9 E-1	3.0 E-1	6.5 E-1	1.9 E-2	4.1 E-2
St. Marys River Surface Water	ne	na	na	na	na	ne	na	na	na	na
Pond Surface Water	ne	3.4 E-7	9.6 E-7	3.4 E-7	9.6 E-7	ne	3.4 E-7	9.6 E-7	3.4 E-7	9.6 E-7
St. Marys River Sediment	ne	7.2 E-8	1.6 E-7	8.4 E-8	1.7 E-7	ne	7.2 E-8	1.6 E-7	8.4 E-8	1.7 E-7
Pond Sediment	ne	1.2 E-7	2.6 E-7	1.4 E-7	2.7 E-7	ne	1.2 E-7	2.6 E-7	1.4 E-7	2.7 E-7
Ambient Air	ne	9.6 E-4	6.1 E-4	9.4 E-3	1.2 E-2	1.9 E-2	1.5 E-1	9.5 E-2	9.4 E-3	1.2 E-2
Total:	**ne**	**1.5 E-3**	**1.9 E-3**	**9.9 E-3**	**1.4 E-2**	**2.1 E-1**	**4.6 E-1**	**7.5 E-1**	**2.9 E-2**	**5.5 E-2**

Shaded values exceed 10^-6 cancer risk

ne = no exposure

na = some chemicals in this area not detected or toxicity information not available.

and exposed populations.

Based on total estimated exposures and current toxicity information, total carcinogenic risk levels to exposed populations from chemicals of potential concern at the Cannelton site range from $1.5x10^{-3}$ to $7.5x^{-1}$. These risk levels exceed the target risk range of $1x10^{-4}$ to $1x10^{-6}$ excess lifetime cancer risk. These exceedances are primarily caused by exposures to disposal and plant area soils, other site soils, ground water (future potential populations only), and ambient air.

Hazard indices exceed one for all populations evaluated. These exceedances are primarily caused by exposures to disposal and plant area soils and ground water (future potential populations only).

The carcinogenic risks associated with exposure to river water, river sediments, pond water, and pond sediments are less than $1x10^{-6}$ for all populations. The hazard indices associated with exposure to river water, river sediments, pond water, and pond sediments were less than 1.0 for all populations. Based on the exposure assumptions and available toxicity information, the risks to human health associated with surface water and sediments are not significant.

The estimated risks from inhalation of ambient air are most likely overestimated for all populations because the air models are very conservative.

As mentioned earlier, sediment and soil toxicity testing and benthic macroinvertebrate studies were performed in order to better assess impacts to the environment. Following is a summary of the ecological assessment performed at the site.

The site consists of field, young forest, and wetland habitat. The site is suitable habitat for a variety of small wildlife. The area of the St. Marys River in which the Cannelton site is located is a spawning and nursery area for several fish species. This area is also a critical spawning area for whitefish (Coregonus clupeaformis) and walleye (Stizostedion vitreum vitreum). The site and nearby areas provide good habitat for water fowl and are located along an important bird migration route. There are no known occurrences of Federal- or State-listed endangered, threatened, or otherwise significant species, natural plant communities, or natural features at the Cannelton site.

Detected concentrations of chromium in the surface water of the St. Marys River exceed specific federal and state standards. The maximum detected concentration of chromium exceeds the acute and chronic freshwater quality criteria, the Great Lakes Water Quality Agreement of 1978, and the Michigan Act 245 (Rule 57) guidelines.

Several studies were done to assess risks to various aspects of the environment. Specifically, sediment toxicity studies, benthic macroinvertebrate community studies, and a soil toxicity study were performed. The results of these studies were compared to the results of sediment and soil chemical analyses. A wetlands quality assessment was also done.

An attempt was made to use these types of tests to derive ecologically based clean-up standards for sediments and soils in wetland areas, which proved to be unsuccessful due to a lack of correlation between effects and concentrations of contaminants. The following is a brief summary of the results of sediment toxicity studies performed on the organisms Chironomus riparius and Hyalella azteca and soil toxicity studies performed on earthworms.

For Chironomus riparius, the toxicity tests indicate that sediments are not acutely toxic to this organism. There were no statistically significant differences in mortality between sample locations and the reference location or the laboratory control. Some statistically significant differences in mean growth were observed in sediments from locations ERT-Sd1 and ERT-Sd2.

The results of the Hyalella azteca test were mixed. Mortality was observed in all sediment sample locations, including the upstream reference location, and ranged from 45% to 100%. There was no correlation between observed mortality and chromium concentrations, nor with any other metal concentration or physical parameter measured. For instance, the sample with the highest concentration of chromium, which was location ERT-Sd2 with 40,000 ppm chromium, resulted in mortality of 53.35%. The reference location, ERT-Sd3 with 10 ppm chromium, resulted in a similar percentage of mortality of 56.65%. These results indicate that chromium concentrations were not the major or sole factor influencing the test results, making interpretations difficult.

The results of the earthworm toxicity test were similar to the Hyalella azteca results in that mortality was observed in some samples, but no correlation between any chemical concentration and percent mortality was found. The highest mortality (100%) was observed in soil sample 8 (ERT-S8), where total chromium was 22,000 ppm. No mortality was observed in the sample with the highest chromium level, ERT-S13 with 26,000 ppm chromium. Earthworms in soil from the reference location had the third highest mortality observed, where total chromium was only 28 ppm. The results were similar in the bioaccumulation studies, where the amount of chromium accumulated did not correlate with chromium concentrations in the samples.

The results of these studies were in some cases difficult to interpret. When looking at test mortality, none of the results showed that there was a relationship between chemical concentrations or other measured parameters and the effects seen in

the laboratory tests. Benthic communities in Tannery Bay did appear to be stressed relative to reference locations, but again these effects could not be associated with any chemical concentrations.

There are several confounding factors which could have influenced the test results. Sediment type, presence of tannery waste material and saw dust in the sediment may have been factors in the sediment toxicity tests conducted in the laboratory. In the benthic community studies, communities could be affected by physical habitat of the bay with the presence of tannery waste material, saw dust and scrap lumber; constantly changing water levels due to seiche effects and boat passage; and inherent differences between bay communities and river communities. While some effects were observed, no cause and effect relationship could be established between site contaminants and impacts to the environment based on the studies done to date.

The wetlands quality assessment indicated that the wetlands contained diverse habitats ranging from open water to forested wetlands. These wetlands appear to be functioning as quality habitat, supporting diverse plant and animal life.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF ALTERNATIVES

Seven alternatives were developed and evaluated for the Cannelton Industries site. Alternatives 1 through 6 are presented in more detail in the Feasibility Study document, while Alternative 7 was developed later and can be found in a Feasibility Study Addendum. Both of these documents are available in the information repository and the Administrative Record file for the site.

It should be noted that all the alternatives, with the exception of Alternatives 1 and 6, are similar in that they require the excavation of waste, soils and sediments and disposal in a landfill. The differences are in the amount of material to be excavated, whether the contaminated material is deposited in an on-site or off-site landfill, and whether the waste is treated before disposal. Alternative 1: No Action, and Alternative 6, which involves capping, or covering, the waste material in place, are the other two approaches considered. All alternatives are described in more detail below.

The site has been divided into five different zones because of the potential for location-specific remediation strategies within the site. Zone A includes the western shoreline where general refuse was dumped. Zone B is the main tannery waste discharge area. Zone

C is comprised of the soils and wetlands of Tannery Point as well as some additional soils along South Street. Zone D includes all the affected sediments in the St. Marys River and in Tannery Bay. Zone E is the former plant area. The zones are shown in Figure 3. These designations will be used throughout the remainder of this ROD.

The costs presented for each alternative include capital costs (such as equipment, labor and other construction expenses to put the remedy in place) and operation and maintenance (O&M) costs (such as monitoring the groundwater or maintaining the cap). These costs are then presented as a "net present worth," a method of economic calculation that estimates the total amount of money which would need to be invested today at 5 percent interest, assuming a 30 year project life, in order to cover initial construction costs as well as future maintenance costs.

A list of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) which apply to the site are listed and described in the Statutory Determinations Section of this ROD. The major ARARs for the following alternatives include: Michigan Act 307; Michigan Act 245, Part 4, Rule 57; Michigan Act 641; RCRA Subtitle D; Safe Drinking Water Act; and the Clean Water Act.

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Alternative 1: No Action

Superfund regulations, which are contained in the National Contingency Plan (NCP), require that a "no action" alternative be considered at every site. This alternative serves as the basis to which all other alternatives can be compared. Under this remedial alternative, no active remedial action or institutional action would be taken regarding the site.

Timeframe: Not Applicable
Capital Costs: $0
O & M Costs: $0
Net Present Worth: $0

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Alternative 2: Removal and Disposal of Debris, Waste, Soils, and Sediments in an On-Site Landfill; Dewatering of Areas During Excavation; Treatment and Disposal of Groundwater from Dewatering Operation.

Under this alternative, debris, waste and soils would be excavated from Zones A, B, C and E. Before and during excavation in Zones B and C, groundwater from the excavation area would have to be collected to aid in excavation. A passive drain system could also be used to lower the water table in Zones B and C. Collected

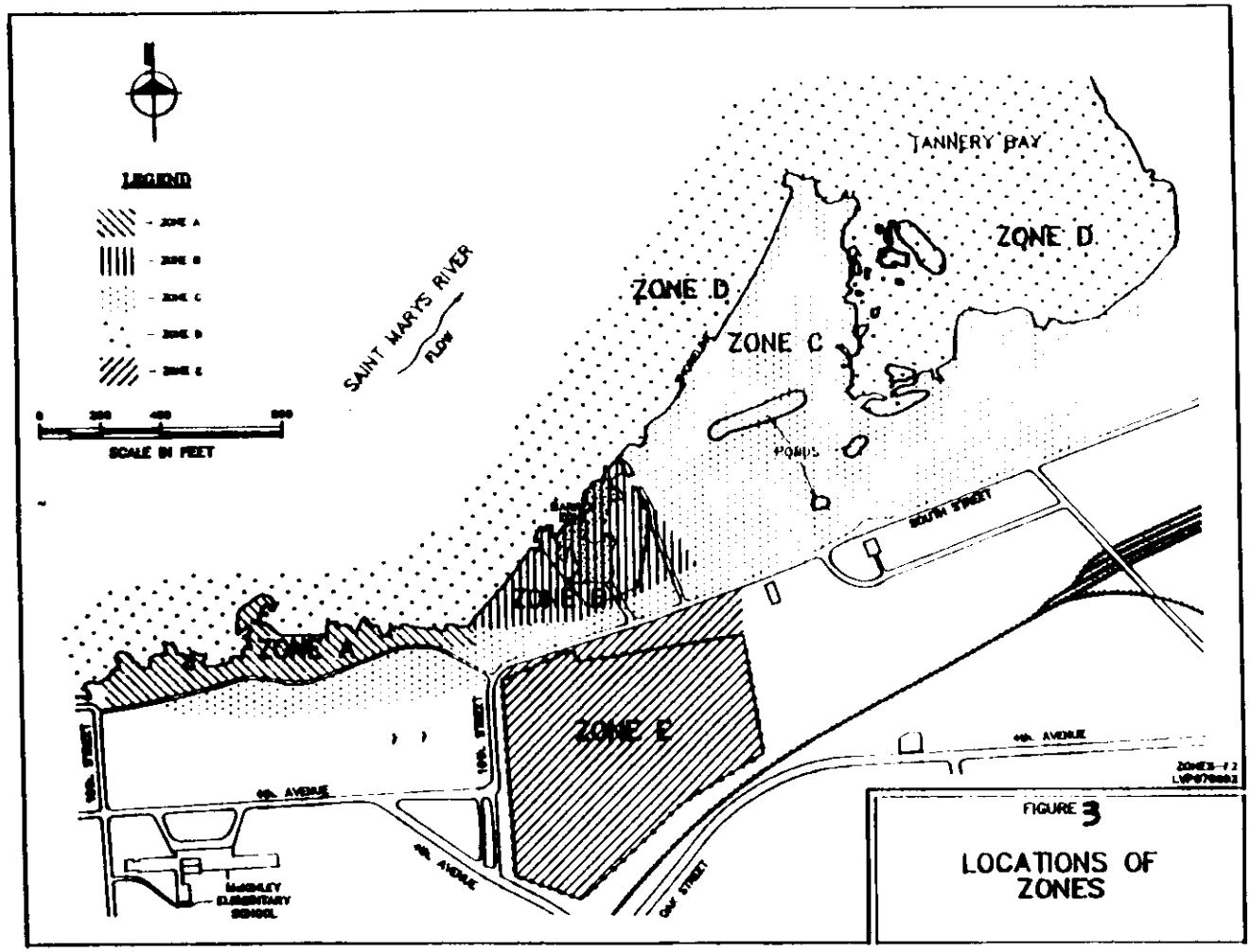

FIGURE 3

LOCATIONS OF ZONES

groundwater would be disposed after analysis and any necessary treatment in compliance with appropriate regulations. All excavated and dredged material would be placed in an on-site solid waste (Subtitle D, Michigan Act 641) landfill, and the landfill would be closed after the removal of soils, waste and sediment was complete. Excavated areas in Zones A, B and C would be filled with clean soil to stabilize the shoreline and revegetated to minimize erosion. Groundwater would be monitored over time to see if removal of contaminated soils was effective in improving groundwater quality and to detect any potential releases from the on-site landfill.

In order to determine how much soil and sediment would be excavated, cleanup criteria were developed for each site contaminant. The criteria are the highest concentrations of a chemical which could be left behind after the cleanup is done. For this alternative, the cleanup criteria for soils are based on background concentrations of a chemical found near the site, or on a calculation of 20 times the groundwater standard, whichever number is higher. If both of these numbers are below the level at which the chemical can be detected, then the cleanup number is set at the detection limit. This approach is based on Michigan's Environmental Response Act 307. The sediment criteria for chromium were based on a model which attempted to predict how much chromium might leach out of sediments into surface water. The groundwater is expected to meet drinking water standards at completion of the remedial action.

Estimated volume to be removed: 406,500 cubic yds
Timeframe for remedial action: 3-4 years
Capital Costs: $27,400,000
O & M Costs: Year 1 -- $458,000
Years 2-3 -- $449,000
Year 4 -- $579,000
Years 5-8 -- $303,000
Years 9-30 -- $185,000
Net Present Worth: $30,200,000

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Alternative 3: Removal and Disposal of Debris, Waste, Soils, and Sediments in an Off-Site Landfill; Dewatering of Areas During Excavation; Treatment and Disposal of Groundwater from Dewatering Operation.

All ground water collection and treatment, excavation, dredging, removal actions and cleanup criteria would be identical to that of Alternative 2. Disposal of excavated and dredged material would be in an off-site solid waste landfill, permitted and in compliance with RCRA Subtitle D and Michigan Act 641. Groundwater monitoring would be done for a shorter period because there would not be an on-site landfill.

Estimated volume to be removed: 406,500 cubic yds
Timeframe for remedial action: 3-4 years
Capital Costs: $32,700,000
O & M Costs: Year 1 -- $458,000
Years 2-3 -- $449,000
Year 4 -- $444,000
Years 5-8 -- $156,000
Years 9-30 -- $0
Net Present Worth: $34,800,000

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Alternative 4: Removal of Debris, Waste, Soils, and Sediments; On-Site Incineration of Organic Waste Material from Zones B and D; Dewatering of Areas During Excavation; Treatment and Disposal of Groundwater from Dewatering Operations; and Disposal of Debris, Waste, Soils, and Sediments in an On-Site Landfill.

All ground water collection and treatment, excavation, dredging, removal, cleanup criteria, on-site disposal actions and monitoring will be identical to that of Alternative Two. Incineration would be used to reduce the volume of the waste in Zone B and a portion of the sediments in Zone D to be placed in the on-site landfill. The ash residue might have to be treated prior to disposal because it may then be a RCRA characteristic waste. A transportable, rotary kiln incinerator would be mobilized on-site to carry out this alternative.

Estimated volume to be removed: 406,500 cubic yds
Timeframe for remedial action: 3-4 years
Capital Costs: $45,700,000
O & M Costs: Year 1 -- $458,000
Years 2-3 -- $449,000
Year 4 -- $579,000
Years 5-8 -- $303,000
Years 9-30 -- $171,000
Net Present Worth: $49,800,000

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Alternative 5: Removal of Debris, Waste, Soils, and Sediments; On-Site Incineration of Organic Waste Material from Zones B and D; Dewatering of Areas During Excavation; Treatment and Disposal of Groundwater from Dewatering Operations; and Disposal of Debris, Waste, Soils, and Sediments in an Off-Site Landfill.

All ground water collection and treatment, excavation, dredging, removal, cleanup criteria, and incineration actions would be identical to that of Alternative 4. Disposal of removed/treated material would be in an off-site RCRA Subtitle D/Act 641 solid waste landfill. Monitoring requirements would be the same as those for Alternative 3.

Estimated volume to be removed: 406,500 cubic yds
Timeframe for remedial action: 3-4 years
Capital Costs: $49,500,000
O & M Costs: Year 1 -- $458,000
Years 2-3 -- $449,000
Year 4 -- $444,000
Years 5-8 -- $156,000
Years 9-30 -- $0
Net Present Worth: $51,500,000

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Alternative 6: Removal and Disposal of Debris and Sediments in an On-Site Landfill; Cap All Other Areas; and Collect Groundwater from Zones B and E and Treat and Dispose.

Under this alternative, only the debris and soils in Zone A and the waste and sediments in Zone D would be excavated and disposed of in a Subtitle D/Act 641 solid waste landfill that would be constructed on-site. These Zones would be excavated because of the difficultly of in-place containment. Cleanup standards for the excavation would be the same as for Alternatives 2, 3, 4 and 5. The rest of the waste and contaminated soil would be left in place, and these areas would be regraded to facilitate drainage, capping, and revegetation. A solid waste cap with a low permeability layer would be placed over Zone B to minimize infiltration/leaching. A single-media, permeable cap would be placed over Zones C and E to prevent direct human contact. The cap systems would also reduce the potential for particulate air emissions and contaminant migration to surface water via storm water run-off and erosion. Groundwater discharging from Zone B would be collected via an interceptor trench, discharged by pumping to the sanitary sewer, and treated off-site at the POTW. Wetlands losses in Zones B and C could be mitigated by backfilling a portion of Zone D (Tannery Bay) to the average water level of the St. Marys River and by vegetating. The area excavated along the St. Marys River in front of Zones B and C would be backfilled with sand, and a break wall (rip-rap barrier) would be installed to minimize erosion. Excavated areas in Zone A would be filled with clean soil to stabilize the shoreline and revegetated to minimize erosion.

Estimated volume to be removed: 166,800 cubic yds
Timeframe for remedial action: 3-4 years, plus long-term groundwater collection and treatment
Capital Costs: $20,000,000
O & M Costs: Year 1 -- $458,000
Years 2-3 -- $420,000
Year 4 -- $598,000
Years 5-8 -- $363,000
Years 9-30 -- $363,000
Net Present Worth: $25,900,000

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Alternative 7: Removal and Disposal of Debris, Waste, Soils and Sediments in an On-Site Landfill; Dewatering of Areas During Excavation; Treatment and Disposal of Groundwater from Dewatering Operation; Preservation of On-Site Wetlands to the Extent Possible.

This alternative is similar to Alternative 2, except that the cleanup criteria which determine the volume to be excavated are different. The cleanup criteria for soils are based on concentrations which would be protective if people were to ingest or contact soils or sediments or inhale dust from the site. The effects of contamination and waste material on the environment were also taken into account. Soils and sediments which exceed these criteria and tannery waste material in Tannery Bay and in the St. Marys River would be removed and placed in an on-site solid waste landfill. Sediments in Tannery Bay which do not exceed the clean-up criteria would be contained in place.

Groundwater would be addressed by excavation of the contaminated source material (soils and waste) and would be monitored after the cleanup was complete. Since groundwater would be collected and treated during excavation activities and the majority of the source of contamination would be removed, it is expected that groundwater would meet health-based drinking water standards in the aquifer and would be protective of surface water. If it was found that health-based drinking water standards were not met after removal of soils and waste, deed restrictions would be placed on groundwater beneath the site so that no drinking water wells would be installed. Long-term monitoring of the groundwater would be performed.

Surface water would also be addressed by removal of soils and sediments above the cleanup criteria as well as removal of tannery waste material from the river and Tannery Bay. Surface water would also be monitored and would be expected to meet Michigan surface water criteria under Act 245, Part 4, Rule 57. Since contamination above background levels of chemicals such as chromium and mercury would be left in the wetlands and sediments of Tannery Bay, additional monitoring of the environment would be performed. The main shoreline would be stabilized as necessary to allow for revegetation and to prevent erosion.

Estimated volume to be removed: 199,700 cubic yds
Timeframe for remedial action: 3-4 years
Capital Costs: $14,400,000
O & M Costs: Year 1 -- $458,000
Years 2-3 -- $449,000
Year 4 -- $579,000
Years 5-30 -- $303,000
Net Present Worth: $19,700,000

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SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES: THE NINE CRITERIA

In accordance with the NCP, the relative performance of each alternative is evaluated using the nine criteria [Section 300.430(e)(9)(iii)] as a basis for comparison. An alternative providing the "best balance" of tradeoffs with respect to the nine criteria is determined from this evaluation.

Threshold Criteria

Overall Protection of Human Health and the Environment: determines whether an alternative eliminates, reduces, or controls threats to human health and the environment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs): evaluates whether the alternative meets federal and state environmental laws pertaining to the site.

Balancing Criteria

Long-Term Effectiveness and Permanence: considers the ability of an alternative to protect human health and the environment over time.

Reduction of Toxicity, Mobility or Volume Through Treatment: evaluates an alternative's use of treatment to reduce the harmful nature of contaminants, their ability to move in the environment, and the amount of contamination present.

Short-Term Effectiveness: considers the length of time needed to implement an alternative and the risks it poses for workers, residents, and the environment during implementation.

Implementability: considers the technical and administrative feasibility of implementing an alternative.

Cost: includes estimated capital and operation and maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

State Acceptance: considers whether the state agrees with U.S. EPA's analyses and recommendations as presented in the RI/FS and the Proposed Plan.

Community Acceptance: summarizes the public's general response to the alternatives described in the Proposed Plan and the FS. The specific responses to public comments are addressed in the

Responsiveness Summary attached to this ROD.

EVALUATION OF THE ALTERNATIVES AGAINST THE NINE CRITERIA

The following analysis evaluates the seven alternatives under each of the nine evaluation criteria.

1) Overall protection of human health and the environment. All alternatives, except Alternative 1, would be expected to provide long-term protection of human health by reducing or eliminating exposure pathways. In addition, the environment would be protected in the long-term by all alternatives (except Alternative 1) through reduction of the quantity of contamination that is released or exposed to the environment.

Alternatives 2, 3, 4, and 5 are similar in terms of their protection of human health and the environment. In each of these alternatives, the materials of concern (wastes, soils, and sediments) would be removed from the environment and placed in a secure landfill, where the potential for migration of the contaminants into ground water, surface water, and ambient air is significantly reduced and the potential for direct contact with contaminants is eliminated. Removal of the quantity of soils proposed in these alternatives would eliminate a diverse, high-quality 15-acre wetland . Excavation and dredging of the sediments would eliminate the potential leaching of contaminated sediments to surface water and would provide a clean habitat for bottom-dwelling animals, but these activities could resuspend contaminated sediment in the short-term.

Alternative 6 would use a solid waste landfill cap for reducing the infiltration of water through the most severely impacted areas and a modified, single-media cap of porous soils for minimizing the possibility of human dermal contact in other impacted areas. The caps would also be intended to limit migration of contaminants in storm water run-off to surface water and air emissions to acceptable levels. Erosion controls would be implemented along the St. Marys River and Tannery Bay shorelines to reduce potential for transport of contaminated solid waste or soil particulates into surface water. The contaminated sediments at the site would be isolated from human contact through removal and disposal in an on-site landfill with a cap.

Alternative 7 removes a lesser volume of soils and sediments, but the remaining chemical concentrations would be below levels which present a human health risk due to ingestion or dermal contact with soils and sediments or inhalation of dust from the site. All removed material would be contained in an on-site landfill. Since chemical concentrations in the wetlands and in the sediments also have not been shown to be significantly toxic to organisms in the studies done to date, Alternative 7 is also protective of the environment. Additional benefit is realized by preserving the

wetlands to the extent possible and by reducing the amount of dredging and potential resuspension of contaminated sediments. Removal of tannery waste material from the bay will improve the physical habitat for benthic organisms and reduce the potential for resuspension of exposed tannery waste material on the shorelines of Tannery Bay.

Public health may be affected by short-term emissions of airborne contaminants during construction activities for all the remedial alternatives except Alternative 1. However, these emissions would be reduced or eliminated via implementation of dust control measures in all the alternatives.

2) Compliance with ARARs: With the exception of Alternative 1, all alternatives would meet the chemical-specific, action-specific and location-specific requirements set forth in federal and state laws. Michigan's Act 307 is a comprehensive law and regulation which applies to this site. Alternatives 2, 3, 4, and 5 meet specific cleanup standards presented in Act 307, while Alternatives 6 and 7 meet the site-specific requirements in Act 307. Further explanation of Michigan Act 307 and the other ARARs for this site can be found in the Statutory Determinations Section.

3) Long-term effectiveness and permanence:
Alternatives 2 and 4 would be effective in the long-term. Although the amount of contamination on the site would not be reduced (simply transferred from one point to another), the contamination in the soils and sediments would be effectively isolated from the environment by the on-site landfill cap and liner. Residual contamination accessible to the general public after completion of remedial activities would be minimal and would be below acceptable levels. The long-term effectiveness of these alternatives is a function of the long-term integrity of the landfill, which is expected to be good if the landfill is well-designed and maintained over time.

Alternative 7 also provides long-term effectiveness and is similar to Alternatives 2 and 4. Highly contaminated soils and sediments would be isolated in the on-site landfill, while some soil and sediment contamination below acceptable human health-based levels would be managed in place. Evidence to date indicates that contaminant levels being left in place are also not harmful to the environment. The long-term effectiveness of these alternatives is a function of the long-term integrity of the landfill, which is expected to be good if the landfill is well-designed and maintained over time.

Alternatives 3 and 5 would also be effective in the long-term. The amount of contamination on the site would be reduced via transportation off-site. Residual contamination that would remain after completion of remedial activities would be minimal and would be below acceptable levels. The long-term effectiveness of these

alternatives would be a function of the long-term integrity of the landfill. If the waste is disposed of in a properly designed facility, the long-term effectiveness would be similar to that of waste stored in an on-site landfill.

The ground water cleanups for Alternatives 2, 3, 4, and 5 are expected to be effective in the long-term because the soils which exhibit potential for leaching unacceptable levels of contamination would be removed and the ground water which exceeds acceptable levels would be recovered. Alternative 7 is expected to be as effective as Alternatives 2, 3, 4 and 5 even though levels of contaminants above background will be left in soils. Levels in the groundwater after remediation are expected to be protective of human health and the environment and will be monitored. The long-term effectiveness of the ground water cleanup for Alternatives 3 and 5 may be more reliable than that for Alternatives 2, 4 and 7 because no wastes, soils, and sediments would remain on-site.

Alternative 6 would be effective in the long-term provided that the landfill cap, soil cover and shoreline erosion control were properly and effectively maintained. Since waste material would continue to be in contact with groundwater in Zone B, collection of groundwater and off-site treatment in a POTW may be necessary. This approach would probably not be as effective as removing highly contaminated waste and soils from contact with groundwater.

4) Reduction in toxicity, mobility or volume through treatment: In Alternatives 2, 3, 6, and 7, no treatment process is used to address soils or sediments. Therefore, there is no reduction in toxicity, mobility or volume through a treatment process. Alternatives 4 and 5 utilize incineration to treat organic waste materials from Zone B and part of Zone D. This treatment of soils and sediments will reduce the volume of waste to be disposed, but it may increase the mobility of metals in the resulting ash, because the organic material to which the metals are probably currently bound will be destroyed.

5) Short-term effectiveness: For all alternatives , there could be dust emissions during excavation activities to which workers and the surrounding community could be exposed. To address this threat, dust control measures will be implemented during excavation activities, and workers will wear protective clothing to reduce the risks associated with remediation. There will also be a higher than usual volume of construction traffic for Alternatives 2-7 because of the transport of materials either to or from the site. All alternatives would take a similar amount of time to implement.

Alternatives 2, 3, 4, and 5 will create a short-term impact to the environment by excavating the 15-acre wetlands on Tannery Point. This would result in a loss of habitat for numerous birds, mammals and amphibians which currently occupy the area. The wetlands would

probably be re-established, although it may be difficult to re-establish a wetlands of similar quality and diversity. Alternative 6 would create a similar impact to the wetlands by clearing the vegetation and putting a soil cover over the area. While Alternative 7 would require some wetlands to be excavated, an objective of the alternative is to preserve the wetlands area to the extent possible and allow some localized areas of contamination to remain in place.

6) Implementability: All the alternatives are technically feasible because the technology exists for the various remedy components, including excavation, dredging, incineration and landfill construction. Administratively, the alternatives which call for on-site landfilling would be somewhat easier to implement because a permit for landfill construction would not have to be obtained from the State. Depending on the off-site landfill chosen for Alternatives 3 and 5, a permit for construction of a new landfill cell may be required to accommodate the volume of waste material removed from the site. This is based on contact with the landfill in Chippewa County. If Alternatives 2 or 4 were to be implemented, additional land adjacent to the former plant site may have to be used for the landfill in order to accommodate the large volume of material.

For all alternatives, if the remedy chosen is not found to be protective of human health and the environment, additional remedial action could be undertaken fairly easily if determined to be necessary. Clean soil used to backfill excavated areas would have to be removed before additional contaminated soils or sediment removal could take place. For Alternatives 2, 4 and 7, the on-site landfill options, any additional soil or sediment removed would require off-site disposal or construction of another on-site landfill cell, since the on-site landfill would probably have already been closed.

7) Cost: The capital costs, operation and maintenance costs and net present worth of each remedial alternative are listed after each alternative description above. Cost-effectiveness is discussed in the Statutory Determinations section below.

8) State Acceptance: The State of Michigan has not concurred with the remedy as selected in this ROD.

9) Community Acceptance: Community acceptance is assessed in the attached Responsiveness Summary. The Responsiveness Summary provides a thorough review of the public comments received on the Proposed Plan, and the Agency's responses to those comments.

THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, as amended by SARA, the NCP, the detailed analysis of alternatives and public

comments, U.S. EPA has selected Alternative 7, as the remedial action for the Cannelton Industries site. Given the available information, the Agency believes that this alternative is protective of human health and the environment, complies with ARARs, provides the best balance of trade-offs under the nine criteria, and also represents a cost-effective solution. The main differences between this alternative and the other excavation and dredging alternatives being considered are the chemical clean-up criteria being used to determine how much excavation is necessary and the location of disposal.

Alternative 7 involves the excavation and consolidation of waste material, soils and river sediments which exceed specific chemical standards into an on-site landfill. The chemical standards and their derivation are described below, but, in general, the remaining concentrations in soils and sediments will attain, for each contaminant, a $1x10^{-6}$ carcinogenic risk level or a hazard index of 1.0 or less for exposure due to ingestion, dermal contact or inhalation. Application of the groundwater model showed that current levels of chromium, lead and mercury in soils may not be protective of surface water. Additional testing of chromium, lead and mercury will help determine what residual levels of these three contaminants in soils and sediment will be protective of surface water and the ecosystem. Once standards are derived, short-term and long-term effectiveness and cost-effectiveness will be taken into account when delineating excavation areas. Only material from the site will be placed in the landfill, which will be closed after all excavation is complete. The landfill will be constructed and closed according to the technical standards of RCRA Subtitle D and Michigan Act 641 regulations. Sediments in the St. Marys River which do not exceed the cleanup criteria will be left in place. Groundwater will be addressed by excavation of the contaminated source material (soils and waste) and will be monitored after the cleanup is complete. Surface water will be addressed by removal of soils and sediments above the cleanup criteria, removal of tannery waste material from the river and Tannery Bay, and long-term monitoring.

The estimated capital costs are $14,400,000 and the net present worth is $19,700,000. Estimated Operation and Maintenance costs are $458,000 for the first year, $449,000 for years 2-3, $579,000 for year 4, and $303,000 for years 5-30.

Rationale for Selection

The criteria used for Alternatives 2, 3, 4, 5 and 7 would protect people from health effects due to ingestion of and dermal contact with the soils and sediments and inhalation of dust particles from the site. The criteria for Alternatives 2, 3, 4 and 5 would also protect groundwater, and subsequently surface water, from leaching of contaminants from the soils, based exclusively on the "twenty

times groundwater" standards presented in Michigan Act 307. However, based on the current groundwater and surface water information which shows that these two media at present are only minimally contaminated and currently present no unacceptable risk to human health, the soil clean-up standards proposed under Alternative 7, including those to be derived through additional testing, would be protective of groundwater and surface water, especially when taking into account the large flow volumes of both the groundwater discharge and the St. Marys River.

It is likely that after cleanup standards are derived and excavation is complete, levels of contaminants above background will remain. Contaminants above cleanup standards in select areas may also remain. EPA believes that management of some contamination in place under Alternative 7 is protective of the environment, based on the relative impacts of contaminant effects compared to the effects of excavation and dredging activities. The environmental benefits which may result from removal of all contamination must be weighed against the destructive nature of the excavation activities which would be required.

Although it cannot be definitively stated that the contaminants are having no effect on the environment, no impacts to the environment have been clearly associated with even the high levels of contamination, in the ecological toxicity studies done to date. In applying any newly derived cleanup levels for chromium and mercury in soils and sediment, the short-term and long-term effectiveness and cost-effectiveness of removing the material will be taken into account. This may result in some levels of contaminants above derived standards to be left in soils and/or sediment. U.S. EPA's opinion is that large-scale destruction of a quality wetland habitat and dredging and possible resuspension of a large volume of sediments would degrade the environment more than leaving some elevated levels of chemicals in place and may not be cost-effective. Removing tannery waste material from the St. Marys River and Tannery Bay will remove areas with the highest levels of contaminants found in the sediments, and will greatly improve the habitat for benthic organisms. All concentrations left will be below acceptable human health-based levels, and monitoring of the residual contamination and its effect on the environment will be done to ensure that the remedy is protective.

Performance Standards

1. **Soil** -- In general, clean-up standards for individual chemicals are based on the Direct Human Contact (DHC) standard, as presented in Michigan Act 307 under a Type B soil clean-up, to protect human health based on ingestion and dermal contact threats. DHC numbers are derived based on the algorithm set forth in Michigan Act 307 R 299.5711(5). These calculations use the most recent toxicological data, and are

based on a carcinogenic risk level of $1x10^{-6}$ or a hazard index of 1.0. Other factors, such as the method detection limit and background concentrations, were also taken into account. It is required that remaining soils concentrations will also be protective of groundwater and subsequent discharges to surface water.

For cadmium and lead, the DHC, as calculated per Act 307, is selected as the cleanup level. The DHCs are 100 mg/kg for cadmium and 400 mg/kg for lead. To confirm whether these concentrations will ultimately be protective of groundwater and surface water, leachate tests pursuant to Act 307 R 299.5711(2)(b), or another appropriate method developed by EPA will be performed. For any leachate studies performed, the concentration of the leachate will be evaluated against the health-based standard for the medium with which the soil interfaces, and its ability to comply with Act 307, R 299.5713. In accordance with Act 307, R 299.5707, if soil leachate or other approved studies as described above find the contribution of contaminants from site soils to be within the range of the contribution from background soils, compliance with the Act will be considered to have been attained.

In the case of arsenic, the DHC was very low. Since the DHC was below background levels near the site, the background concentration, calculated using existing data to be 12.8 mg/kg, was chosen as the clean-up standard. For the carcinogenic polynuclear aromatic hydrocarbons (PAHs), the DHC values are all the same and are below the method detection limit (MDL) for PAHs. Therefore, the clean-up number for carcinogenic PAHs is the MDL, which is 0.33 mg/kg. Samples to determine background concentrations of PAHs in the vicinity of the site can be collected and will be applied as the cleanup standard if less stringent.

A slightly different approach was taken with chromium, based on the fact that the inhalation route of exposure, rather than the DHC route, is the most toxic for both hexavalent and trivalent forms of chromium. Using the air model developed for the Baseline Risk Assessment, under the current residential scenario, acceptable soil concentrations were backcalculated based on a 10^{-6} cancer risk level for hexavalent chromium and a Hazard Index of 1 for trivalent chromium. The results of this calculation are a cleanup standard of 5300 mg/kg for trivalent chromium and 23 mg/kg for hexavalent chromium. To confirm whether this concentration will ultimately be protective of groundwater and surface water, leachate tests pursuant to Act 307 R 299. 5711(2)(b), or another appropriate method developed by EPA will be performed, as described above for lead and cadmium.

For mercury, it appears that the Act 307 DHC may not be protective of the groundwater and surface water, after comparison with the groundwater model presented in the FS Addendum. Upon applying the leachate approach dictated under R 299.5711(2)(a), using TCLP data from the RI, it is found that the present levels of mercury for the soils tested do not leach above the acceptable method detection limit. According to the rule, as stated in R 299.5711(2) and R 299.5721, present levels of mercury at the site may meet a Type B cleanup.

However, EPA acknowledges that, while potentially compliant with the rules, the mercury levels at the site may not be protective of surface water, and believes that further assessment of the site's contribution of mercury to the St. Marys River and the ecosystem is warranted. It will be the objective of the cleanup to reduce the levels of mercury discharging from the site to health-based or background levels, whichever is less stringent. EPA believes that methods with lower detection limits may be necessary to adequately assess the site's impact on the environment due to mercury.

2. **Sediments** -- Excavation, dewatering and placement in an on-site landfill is proposed for those on-shore and near-shore sediments which pose a threat to human health through direct contact or to the river through resuspension and transport. The same clean-up standards which apply to soils also apply to sediments. Tannery waste, consisting of hair and hide material, will also be removed, since the highest levels of contaminants appear to be associated with these materials and since these wastes provide a poor substrate for benthic macroinvertebrate communities. To evaluate those contaminant levels which may remain after the above remediation, additional testing will be conducted prior to excavation to ensure that the cleanup will be protective of human health and the environment. As described above for soils, leachability studies or other appropriate studies shall be performed for chemicals of concern to ensure that sediments do not cause an exceedance of Michigan Act 245, Rule 57 surface water criteria, or background, whichever is less stringent.

3. **Groundwater** -- It is probable that groundwater will meet health-based drinking water standards after the performance standards for soil are met. If health-based drinking water standards are not met, institutional controls in the form of deed restrictions will be sought to prevent installation of drinking water wells. The other performance standard for groundwater is that the discharge of groundwater to surface water is protective of surface water, per Michigan Act 307, R 299.5713. It is expected that after source removal, groundwater conditions will improve and surface water will be

protected. If groundwater conditions do not improve and/or groundwater is found to be adversely impacting surface water, additional measures may be evaluated. To assess the impact of groundwater on surface water, groundwater will be monitored for attainment of surface water criteria in wells lining the site shoreline, or equivalent.

During excavation, groundwater will be collected, analyzed and treated, if necessary, prior to disposal. If it meets the relevant pre-treatment requirements, water can be disposed at the Publicly Owned Treatment Works (POTW). If applicable NPDES standards are met, water can be discharged to the river. If the water analyses show that it does not meet requirements for either of these options, alternate off-site treatment would be required.

4. **Surface Water** -- Surface water will be addressed through the removal of soils and sediments above cleanup standards. After removal, surface water will be monitored and will be expected to meet Michigan Act 245, Rule 57 standards, assuming a site-specific hardness of 40 mg/L, when necessary for the calculation of a standard. The point of standards application will be at all points within the St. Marys River and Tannery Bay. Any exceedance detected will only be considered an exceedance if there is a statistically significant difference between background and site sample concentrations. If background concentrations for a particular contaminant are found to be above the Rule 57 standard, then a background standard will be calculated and will apply. Also, if the Rule 57 standard is below acceptable method detection limits (MDL), then the MDL will apply. Surface water monitoring results will assist in determining whether groundwater and sediment are in fact protective of surface water.

5. **Landfill** -- The on-site containment area will be constructed to meet the minimum technical standards of RCRA Subtitle D or Michigan Act 641, which regulates solid waste disposal, and will be closed in accordance with the same Act. Given the location of the site, an adequate frost protection layer will be required to ensure the integrity of the cap.

6. **Ecological Toxicity Testing** -- Additional ecological toxicity studies will be done to ensure that remaining levels of contaminants in soils and sediment are protective of the environment. These will include studies to assess the bioaccumulative threat of mercury.

7. **Shoreline Stabilization** -- Based on sound engineering practice, the shoreline will be stabilized to the extent necessary after excavation is complete. This is particularly important given the location of South St., which must be protected from potential erosion.

STATUTORY DETERMINATIONS

The selected remedy must satisfy the requirements of Section 121 (a-e) of CERCLA, as amended by SARA, to:

a. Protect human health and the environment;
b. Comply with ARARs;
c. Be cost-effective;
d. Utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; and,
e. Satisfy the preference for treatment as a principal element or provide an explanation as to why this preference is not satisfied.

The implementation of Alternative 7 at the Cannelton Industries site satisfies the requirements of CERCLA, as amended by SARA, as detailed below:

a. Protection of Human Health and the Environment

This selected remedy provides protection of human health and the environment.

Implementation of the selected alternative will reduce and control potential risks to human health and the environment posed by exposure to site contaminants by excavating waste material and soils and sediments above human health-based criteria and containing this material in an on-site landfill. The risk will be reduced to a risk level of $1x10^{-6}$ for carcinogens, and the Hazard Indices for non-carcinogens will be less than one. Removal of waste, soils and sediments will reduce the source of groundwater and surface water contamination.

The selected remedy removes a lesser volume of soils and sediments than other alternatives considered, but the remaining chemical concentrations would be below levels which could cause a human health risk due to ingestion or dermal contact with soils and sediments or inhalation of dust from the site. Since chemical concentrations in the wetlands and in the sediments have not been shown to be significantly toxic to organisms in the studies done to date, Alternative 7 is also protective of the environment. The remedy attempts to balance wetland preservation and reduction of dredging and potential resuspension of contaminated sediments with removing contaminant threats from the environment. Removal of tannery waste material from the bay will improve the physical habitat for benthic organisms and reduce the potential for resuspension of exposed tannery waste material on the shorelines of Tannery Bay. There are no unacceptable short-term risks associated with the remedy.

b. Compliance with ARARs

The selected remedy will comply with all Federal and/or State, where more stringent, ARARs. The following ARARs will be attained.

1. Chemical-specific ARARs

Chemical-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically determine the extent of clean-up at a site. By removal of the source and continued monitoring, EPA believes that all chemical-specific Federal and State ARARs will be met.

Federal ARARs

Safe Drinking Water Act MCLs and MCLGs -- Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs), the federal drinking water standards promulgated under the Safe Drinking Water Act (SDWA), are applicable to municipal water supplies servicing 25 or more people. At the Cannelton Industries site, MCLs and MCLGs are not applicable, but are relevant and appropriate since the aquifer in the area of contamination could be suitable for use as a source of drinking water in the future. MCLGs are relevant and appropriate when the standard is set at a level greater than zero (for non-carcinogens), otherwise, MCLs are relevant and appropriate. The point of compliance is beyond the waste management boundary, which at the Cannelton Industries site will be beyond the edge of the capped containment area.

Clean Water Act -- Under the Federal Water Pollution Control Amendment of 1972, commonly known as the Clean Water Act of 1972 (CWA), the U.S. EPA has established federal guidelines for development of water quality criteria to protect human health and aquatic life from exposure to pollutants. These federal ambient water quality criteria (AWQC) are developed as guidelines from which states determine their water quality standards. While the AWQC themselves have no direct regulatory impact, they are used to derive regulatory requirements which can include water quality-based effluent limitations, water quality standards, or toxic pollutant effluent standards. The use of the AWQC is based on the designated or potential use of the surface water. These are then translated into enforceable effluent limitations in a point source permit National Pollutant Discharge Elimination System (NPDES) for direct discharge to surface waters. Before any facility may discharge into surface water, a NPDES permit is required under the CWA. The St. Marys River is a potential source of drinking water. If there is a discharge to the St. Marys River planned during remediation activities, due to

dewatering activities for example, the substantive requirements of a NPDES permit will be met. In addition, remediation will comply with storm water discharge requirements under the CWA.

Clean Air Act National Ambient Air Quality Standards 40 CFR 50 -- These regulations provide air emission requirements for actions which may release contaminants into the air. As the selected remedy involves excavation and construction activities which may release contaminants or particulates into the air, emission requirements promulgated under this act are relevant and appropriate.

State ARARs

Michigan Act 307 -- The State of Michigan has identified the Michigan Environmental Response Act (referred to as "MERA", "the Act ", or "Act 307") and its implementing rules as ARARs for this site. U.S. EPA finds that only Rules 705(2) and (3), 707 - 715, 717(2), 719(1) and 723 qualify as ARARs in compliance with Section 121(d)(2) of CERCLA. These rules provide for the selection of a remedy which attains a degree of cleanup which conforms to one or more of three levels of cleanup - Type A, B, or C. A Type A cleanup generally achieves cleanup to background or non-detectable levels (R 299.5707); a Type B level meets specified cleanup levels in all media (R299.5709-5715 and 5723) and a Type C cleanup is based on a site specific risk assessment [R299.5717(2) and 5719(1)].

U.S. EPA's selected soil cleanup standards for this site are in compliance with Act 307 and its implementing rules in that they meet the standard for selection of a Type C [R299.5717(2) and 5719(1)], although the standards contain elements of Type A and Type B requirements for particular contaminants in order to achieve protection of human health and the environment. Derivation of the numeric soil cleanup standards is described previously in the "Selected Remedy" section.

U.S. EPA's selected sediment cleanup standards for this site are in compliance with Act 307 and its implementing rules in that they meet the standard for selection of a Type C [R299.5717(2) and 5719(1)]. There are no provisions for Type A or Type B sediment cleanup standards in Act 307. The derivation of standards for sediments is the same as for soils, with the addition of a visual standard for removal of tannery waste material from the St. Marys River and Tannery Bay.

U.S. EPA's selected groundwater cleanup standards for this site are in compliance with Act 307 and its implementing rules in that they meet the standard for selection of a Type C

[R299.5717(2) and 5719(1)]. While is anticipated that groundwater will meet health-based drinking water standards presented under a Type B (R 299.5709) after removal of the source, if groundwater does not achieve these standards, deed restrictions will be sought so that no drinking water wells can be installed at the site. The other performance standard for groundwater is that its discharge to surface water does not adversely affect surface water, per R 299.5713. To assess the impact of groundwater on surface water, groundwater will be monitored for attainment of surface water criteria in wells lining the site shoreline, or equivalent.

U.S. EPA's selected surface water cleanup standards for this site are in compliance with Act 307 and its implementing rules in that they meet the standard for selection of a Type B (R 299.5713). The numeric surface water cleanup standards were derived pursuant to the provisions of Act 245, Rule 57, using a hardness of 40 mg/L where appropriate. Since no mixing zone applies under a Type B, the point of standards application will be throughout the St. Mary River adjacent to the site. Any exceedance detected will only be considered an exceedance if it is significantly different than background samples collected. If background concentrations for a particular contaminant are found to be above the Rule 57 standard, then a background standard will be calculated and will apply. Also, if the Rule 57 standard is below acceptable method detection limits (MDL), then the MDL will apply.

U.S. EPA does not consider the other provisions of Act 307 and its implementing rules identified by the State as ARARs because they are either procedural, not more stringent or do not establish cleanup standards. Additionally, U.S. EPA believes that even if certain of these provisions were considered as ARARs [e.g. the considerations listed in Section 299.5717(3)], the remedial actions and cleanup standards selected for this site are in compliance with these State-identified ARARs since they have been selected in accordance with CERCLA and the NCP.

Michigan Act 245, Part 4, Rule 57 -- This act provides general prohibition of concentrations in surface water for substances which impart unpalatable flavor to food, fish, or otherwise interfere with the reasonable use of the surface water in the state. Rule 57 specifically requires that surface water discharges not be toxic to aquatic life or human health.

Michigan Air Pollution Act 348 -- This act provides air emission requirements for actions which may release contaminants into the air. The selected remedy involves excavation and construction activities which may release contaminants or particulates into the air. This act is relevant and appropriate. This act is also referenced in Act

307 under a Type B (R299.5715) for air quality.

Michigan Safe Drinking Water Act 399 -- This act is an ARAR to the extent that it is more stringent than the SDWA discussed above under Federal ARARs.

2. Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position of a site. These include:

Federal ARARs

Executive Order 11988 - Protection of Floodplains -- This Executive Order is applicable at this site since a portion of the site north of South Street lies within the 100-year floodplain of the St. Marys River. It requires the minimization of potential harm to or within floodplains and the avoidance of long- and short-term adverse impacts associated with the occupancy and modification of floodplains.

Executive Order 11990 - Wetlands Management -- This order is applicable to the site. The order requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands.

Clean Water Act, Section 404 -- This section regulates the discharge of dredged or fill material to water of the United States. Activities during the remedy may be regulated under section 404 of the CWA; therefore, the substantive requirements of section 404 would be relevant and appropriate to the remedial action at the site.

State ARARs

Goemaere-Anderson Wetland Protection Act 203 of 1979 -- This act regulates any activity which may take place within wetlands in the State of Michigan. Act 203 is applicable at this site; it may require the replacement of adversely impacted wetlands with comparable resources.

Soil Erosion and Sedimentation Control Act, Act 347 of 1972 -- This act regulated earth changes, including cut and fill activities, which may contribute to soil erosion and sedimentation of surface waters of the State. Act 347 would apply to any such activity where more than 1 acre of land is affected or the regulated action occurs within 500 feet of a lake or stream. Act 347 would be applicable to the excavation activities since these actions could impact the St. Marys River, which is less than 500 feet from the area to be excavated.

Shoreline Protection and Management Act, Act 245 of 1970 -- This act regulates construction of permanent structures in designated high risk erosion areas, designated flood risk areas and designated environmental areas. Substantive requirements will be met if permanent structures are constructed in areas designated under the act.

3. Action-specific ARARs

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances.

Federal ARARs

Resource Conservation and Recovery Act -- Since tannery waste is exempted as a listed waste and TCLP and other tests have shown that the waste at the site is not characteristically hazardous, only RCRA Subtitle D would be an ARAR at this site. Since a new containment area is being constructed on-site under this alternative, the substantive requirements under Subtitle D would be met.

State ARARs

Michigan Solid Waste Management Act (Act 641) -- As mentioned above, the substantive requirements under this act for constructing and closing new solid waste containment areas would be met, to the extent that they are more stringent than the provisions of RCRA Subtitle D. Also, for the reasons discussed above, the Michigan Hazardous Waste Management Act 64 of 1979, as amended, is not an ARAR at this site.

c. Cost-effectiveness

A cost-effective remedy is one for which the cost is proportional to the remedy's overall effectiveness.

The selected remedy, Alternative 7, affords a high degree of overall effectiveness. It is the least expensive alternative being considered, with the exception of No Action. While Alternative 7 has less stringent soil and sediment cleanup standards than Alternatives 2, 3, 4, and 5, it is still protective of human health and the environment by removing and containing wastes and soils and sediments above health-based criteria. It may also preserve some of the quality wetland areas which currently exist at the site. Alternatives 4 and 5, which involve incineration, are the most expensive. Incineration was evaluated primarily as a way of reducing the volume of material so that disposal costs would be cheaper. However, since the overall cost was higher than those alternatives calling for disposal without treatment, the incineration alternatives did not meet this objective. In

general, alternatives with off-site disposal (3 and 5) were more expensive than those with on-site disposal (2, 4, 6 and 7), but eventually long-term operation and maintenance costs would no longer exist for off-site options since waste would not be left on site. When waste is left on-site, either in an on-site landfill or in place, as in Alternatives 2, 4, 6 and 7, operation and maintenance, which includes monitoring of the site and maintenance of shoreline stabilization, would be on-going. In spite of this, the 30-year net present worth cost for on-site remedies remains below off-site remedies. Alternative 7 is a cost-effective alternative which provides overall effectiveness proportional to its cost.

d. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

U.S. EPA believes the selected remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be utilized in a cost-effective manner for the Cannelton Industries site. Of the alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA has determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability, cost and State and community acceptance.

The alternatives involving incineration were far more expensive, didn't achieve their intended goal (i.e. to reduce the volume of waste to dispose and thereby reduce the overall cost), and could potentially increase the mobility of inorganic contaminants by destroying the organic matter to which the contaminants are currently bound. Other treatment technologies which were tested in treatability studies were found not to be effective.

Therefore, the selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized. The contamination in the waste, soils and sediments, especially considering the low mobility this contamination currently exhibits, can be reliably controlled over time through engineering and institutional controls, and treatment is therefore not practicable.

e. Preference for Treatment as a Principal Element

No principal threat which warrants treatment at the site has been identified. While the waste at the site does not readily fit the definition of a principal threat, it also cannot be classified on the whole as a low level threat. Treatment options were evaluated for the source material (soils, wastes

and sediments), and treatment was found to be impracticable. It was also determined that, given the waste characteristics, chiefly the low mobility of the principal contaminants, containment of the source material would be a safe and reliable option when coupled with institutional controls and monitoring. Based on the comparative analysis of alternatives, it has been determined that treatment does not provide a significant benefit proportional to its cost.

DOCUMENTATION OF SIGNIFICANT CHANGES

The selected remedy, Alternative 7, was modified based on comments and additional information. The derivation of cleanup standards for soils is no longer dependent on the groundwater model presented in the FS Addendum which called for a standard set at "20 times" the backcalculated groundwater concentration if the resulting standard was more stringent that the Direct Human Contact number. Eliminating this approach most significantly affects mercury, which in this ROD has no numerical standard. Further assessment of the site's contribution of mercury to the St. Marys River and the ecosystem will be made. It will be the objective of the cleanup to reduce the levels of mercury discharging from the site to health-based or background levels, whichever is less stringent.

To confirm whether the concentrations of other contaminants of concern, namely chromium, cadmium and lead, will ultimately be protective of groundwater and surface water, leachate tests pursuant to Act 307 R 299.5711(2)(b), or another appropriate method developed by EPA will be performed. Short-term and long-term effectiveness and cost-effectiveness will be taken into account when applying the standards resulting from any of these tests.

It is also noted that, in the FS Addendum, where Alternative 7 was developed, a portion of the wetland of Tannery Point containing a higher concentration of chromium would not be remediated, based on the belief that this was an anomalous area of contamination and the high concentration detected was localized. Additional sampling performed in July and August 1992 by the MDNR demonstrated that this area of higher contaminant concentrations is more widespread that originally thought, and will be remediated to the extent that cleanup standards are exceeded in this area.

RESPONSIVENESS SUMMARY

This Responsiveness Summary has been prepared to meet the requirements of Sections 113 (k) (2) (B) (iv) and 117 (b) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), which requires the United States Environmental Protection Agency (EPA) to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on a proposed plan for a remedial action. The Responsiveness Summary addresses concerns expressed by the public, potentially responsible parties (PRPs), and governmental bodies in written and oral comments received by EPA and the State regarding the proposed remedy for the Cannelton Industries Site.

A. Overview

1. Proposed Plan

The Remedial Investigation (RI) Report was finalized in September 1991. A Baseline Risk Assessment (BRA) was completed in October 1991. The Feasibility Study (FS) for public review was completed in April 1992 and contained six remedial alternatives. A FS addendum, which assessed an alternative to be considered for the site, was finalized in July 1992.

The Proposed Plan for the remedial action included removal and disposal of debris, waste, soils and sediments in an on-site landfill; dewatering of areas during excavation; treatment and disposal of groundwater from dewatering operation; and preservation of on-site wetlands to the extent possible.

Estimated volume to be removed:	199,700 cubic yards
Timeframe for remedial action:	3-4 years
Capital Costs:	$14,400,000
O & M Costs:	Year 1 -- $458,000
	Year 2-3 -- $449,000
	Year 4 -- $579,000
	Years 5-30 -- $303,000
Net Present Value:	$19,700,000

2. Public Comment Period

A public comment period on the proposed plan and FS for this site was held from July 15, 1992 to September 14, 1992. In addition, a public meeting was held on July 28, 1992. At this meeting, representatives from EPA and the Michigan Department of Natural Resources (MDNR) answered questions about problems at the site and the remedial alternatives under consideration. Approximately 100 people attended that meeting. Comments from the public were also accepted at the meeting. During the comment period, EPA received approximately 15 written submittals of comments and 13

oral comments concerning the proposed plan.

B. Community Involvement

The level of public interest regarding this site has been moderate since the listing of the site on the National Priorities List (NPL). Since the issuance of the Proposed Plan for public comment the general public has had opposing views on the selected remedy. Most comments received concerned the opposition to the on-site landfill and volume of material to be managed. Some commentors stated that an on-site landfill is not necessary and that only capping the site should be required.

C. Summary of Significant Comments

The public comments regarding the Cannelton Industries Site are organized into the following categories:

- Summary of comments from the local community regarding the FS and the proposed plan;
- Summary of comments from the PRPs concerning the RI/FS and the proposed plan;
- Summary of comments from MDNR regarding the FS and proposed plan;
- Summary of comments from U.S. Fish and Wildlife Service regarding the RI/FS and the proposed plan.

EPA considered the comments and made some revisions to the proposed plan. The selected remedy is detailed in the ROD. Many of the comments below have been paraphrased in order to effectively summarize them in this document. The reader is referred to the Administrative Record for this site, located at the Bayliss Public Library, which contains copies of all written comments submitted to EPA. The Administrative Record also contains a copy of the public meeting transcript.

COMMENTS FROM THE COMMUNITY

There were a number of written and oral comments received from members of the community. These comments have been summarized into broad categories for ease of presentation. Please refer to the actual comment letters in the administrative record for a more complete reading of the comments.

1. ON-SITE LANDFILL

Several commentors opposed the onsite landfill proposal at the site for the following reasons, and most commentors recommended Alternative 3, offsite disposal of all contaminated materials:

a) Comment: There was concern about the appearance of the landfill where commentors felt that a huge mound of earth surrounded by a fence and warning signs would forever remind residents of the potential danger that exists at the site, and that this would draw negative attention to the community, including creating a negative impact on the tourism in the area.

> **Response:** EPA acknowledges that the landfill will be visible. However, during the design, we will consider options that might minimize the height that the landfill extends such as expanding the area over which the landfill will be constructed and considering alternative construction specifications different from those set out in Michigan Act 641. Although warning signs will be required, and a fence will need to be erected in order to minimize damage to the cap by trespassers, EPA will work with the community to make the landfill as unobtrusive as possible, considering the legal funding constraints we have. At another Superfund site in Michigan that is going to be capped, EPA worked with the community and the Potentially Responsible Parties to landscape the area to minimize the aesthetic negative impacts of the fence and landfill.

b) Comment: Commentor believed that the construction of an onsite landfill would be a violation of Michigan's Solid Waste Management Act, Act 641, since the Solid Waste Management Plan (SWMP) of Chippewa County has not been amended to allow for this construction.

> **Response:** According to the Superfund Law (CERCLA), onsite remedial actions must meet the substantive requirements of environmental laws, but are not required to follow the administrative approval and permitting processes which are specified in those laws. It was Congress' intention that in providing for the permit exemption that this would expedite cleanups. Thus, although no permit or SWMP amendment will be required, EPA will comply with the substantive requirements of Act 641, which has been determined to be an Applicable or Relevant and Appropriate Requirement (ARAR) at the Cannelton site.

c) Comment: Several commentors believed that excavating and consolidating the contaminated soil and sediment in an onsite landfill would create far greater concentrations of the hazardous substances, and consequently greater risk of groundwater and

surface water contamination, than what currently exists.

Response: It is not true that consolidating the waste would create an increase in concentration of the contaminants, since the net mass of contaminants will not increase. Taking the contaminated waste out of the water will decrease the potential for future migration, releases and toxicity. The material will be placed in a landfill completely isolated from the groundwater and surface water. The landfill will be designed to eliminate the potential for the contaminants to leach, assuming the landfill is adequately maintained.

d) Comment: Several commentors expressed concern about who would take on the responsibility for monitoring the site if an onsite landfill is built, and believe that it is unrealistic to expect that this will occur forever.

Response: There are several possible scenarios that may occur. If the PRPs (AMAX) agree to conduct the cleanup at the site, the long-term monitoring will be their responsibility. U.S. EPA will enter into a legally binding agreement with the PRPs specifying their responsibilities. By entering into this type of an agreement, the PRPs will be bound to carrying out these responsibilities. If, on the other hand, the PRPs do not conduct the cleanup, EPA and MDNR would be responsible for paying for the remedial action, paying 90 and 10 percent respectively. The MDNR would be responsible for 100 percent of all costs of operation and maintenance, which includes monitoring, after the first year of O&M.

e) Comment: Several commentors opposed the siting of an onsite landfill in the proposed location, particularly so close to the Great Lakes or its connecting channels, because of the potential for leakage from the landfill into the groundwater or surface water, since the leakage will be in the River before anyone has the time to react. Another commentor wondered how the leachate from the leachate collection system would be treated.

Response: EPA does not consider the potential for leaching into the groundwater and surface water from the onsite cell to be at all significant. Currently, the contaminants within the waste have a very low potential for leaching as is evidenced by the very low levels of contamination in the surface water and groundwater. The landfill will be designed to prevent leachate production since the cap on top of the waste will prevent infiltration of precipitation, and the underlying liner will prevent any infiltration from groundwater. In order to produce leachate, water must come in contact with the waste, which will be prevented by the liner and cap. This will virtually eliminate the

possibility for contaminants to leach into the environment. While there is a concern that all landfills leak, one must consider the characteristics of the waste that will be disposed of in this particular landfill when evaluating this concern. This will be a mono-fill landfill, which means that there will only be one type of waste disposed. This will eliminate the possibility that other types of waste might have an adverse effect on the leachability of the waste. Any leachate that is produced from within the onsite cell will be collected through a leachate collection system and treated by the Publicly Owned Treatment Works, assuming all pretreatment standards can be met and the facility will accept the leachate. If the leachate doesn't meet pretreatment standards, it will be shipped off-site to another location for treatment.

f) Comment: One commentor wondered whether EPA considered the effect of the proposed plan on the residents of Sault Ste. Marie and Chippewa County, while other comments stated that public concern had not been considered.

Response: Contrary to the commentors belief, EPA does consider the views of the public prior to making a decision. This is why there is a public comment period and public meetings. As stated earlier, EPA will work with the community during the design and construction to try to accommodate some of their concerns. EPA has also carefully reconsidered whether consolidating the excavated material on-site is appropriate. While the decision has been made to proceed with an on-site landfill, new information concerning this choice will be considered. (See response to next comment).

g) Comment: Several commentors believe the entire volume of contaminated soils and sediments should be taken off-site.

Response: EPA has considered this comment and the associated concerns carefully, and has chosen on-site disposal of the excavated material for several reasons. These include: 1) the current EPA and MDNR statutory requirement that off-site disposal of untreated waste is the least preferred alternative; 2) the belief, based on current information, that an on-site landfill can be constructed in an environmentally sound manner and will be protective of human health and the environment; 3) that the closest off-site landfill currently does not have the capacity to accept the volume of waste which will be removed from the site, and will need to get a permit for and build a new cell; and 4) taking material to a different landfill further from the site would increase costs dramatically and would therefore not be cost-effective.

However, there are factors which may influence and/or change this decision in the future. These are: 1) If the property owner, Cannelton Industries, does the cleanup and wishes to take the material to an appropriate off-site disposal facility, EPA will work with Cannelton and revise the ROD to allow this; 2) if it is found during the design that there will not be enough capacity on-site to accommodate all the material to be disposed, some or all of the waste could be taken off-site; 3) if information surfaces which indicates that an on-site landfill would not be technically sound or protective; or 4) if, based on the design and new cost estimates, it appears that off-site disposal would be just as cost-effective as on-site.

In regard to the desire to remove the entire estimated volume of contaminated material, EPA wishes to clarify that, ultimately, it is not the volume that is removed which is important in determining a protective remedy, but rather the concentration of chemicals that remain after remediation. EPA is requiring excavation to levels of contaminants which are protective of human health and the environment, and these levels may be above background concentrations for some chemicals. To the extent that this is a smaller volume of material, it may also be preserving areas of the site.

h) Comment: Commentor stated that AMAX (owner of former Tannery Site) has been working with the Solid Waste Planning Committee since January on an Amendment to allow AMAX to remove the contaminated materials from the Barren Zone and deposit them in an offsite landfill in Wayne or Crawford County based on AMAX's concern over the future liability of materials leaching into groundwater or surface water. Commentor wonders why Alternative 7 does not include any offsite removal, and why the EPA is treating the wastes in the barren zone with less concern than AMAX is.

Response: It is accurate that EPA has been working with AMAX to remove a small portion of the waste offsite. However, AMAX has never proposed to take all the contaminated material offsite. The reason AMAX did not complete the proposed work is because the process for modifying the SWMP for Chippewa County was very lengthy, and AMAX was not willing to enter into an agreement with EPA prior to the completion of the amendment process. Since a solution which addressed the entire site was imminent, it seemed to make sense to address the site as a whole. EPA will work with AMAX if they desire to move the contaminated material offsite. Alternative 7 does not include off-site removal because the relative cost difference between on-site and off-site disposal for the same waste volume had already been presented in Alternative 2/3 and Alternative 4/5. The FS Addendum was prepared knowing that off-site disposal was

a possibility, and EPA also considered off-site disposal under Alternative 7 when selecting the remedy.

i) Comment: Many commentors expressed concern that an onsite landfill would render a potentially valuable property useless, since the site could be prime waterfront property suitable for many uses, if properly cleaned up. One commentor believes that the landfill will bring economic hardship to the area's tourist industry and that the solution should be one that disposes the material away from the city's center and the river's edge. Commentor believed that property can and should be used for recreation, light industrial and housing in the future. Another commentor believed that the landfill will lower the tax base of the City. Another commentor believed that the proposed alternative will hurt adjacent landowners by lowering the value of their property.

Response: As the site currently exists, there is exposed waste material in an uncontrolled environment which may cause human health and/or environmental threats. The selected remedy will contain contaminated material above health based levels, which will improve the area. This remedy should improve the value of the property relative to what it is now, where there are exposed materials. While the offsite disposal of the contaminated material might increase the value of the property even more, it is not the charter of the EPA to consider this factor explicitly when making a final decision. Although we realize that a decision for an onsite landfill could impact the surrounding apparent property value, we are required to make our cleanup decisions based on consideration of all public comments, as well as other parties, including those persons whose lives would be affected by the movement across public roads of thousands of truckloads of contaminated material. It is also EPA's preference that untreated waste not be disposed off-site. In addition to Community Acceptance, there are eight other criteria which the Agency must consider in making cleanup decisions (overall protection of human health and the environment, compliance with ARARs, long-term effectiveness, reduction of toxicity, mobility or volume, short-term effectiveness, implementability, cost and state acceptance).

j) Comment: One commentor believed that the Proposed Plan was recommended by the EPA because it was the cheapest solution, and was not a solution which focused on the health and welfare of the local people. Other commentors had concern over the effect of an onsite landfill on human health.

Response: EPA disagrees with this comment. EPA considered many other factors in its decision other than cost. The selected remedy is cost-effective in that the cost is

proportional to the remedy's overall effectiveness. EPA does not believe it to be a good use of public funds to deal with a much greater volume of material when that material is posing no human health or environmental threat. Although this is the least expensive alternative the Agency considered (other than the no action alternative), several commentors proposed a much less expensive solution, which we considered and rejected for various reasons (See comments 5a, b, e, f, & g). In reaching its decision EPA considered the Alternative's ability to protect human health and the environment, the uncertainty of offsite disposal capacity, and the achievement of equivalent effectiveness at a lower cost than the other alternatives. Consideration of these factors together justify the selection of an onsite containment remedy for the Cannelton site.

Regarding the commentor's concern about the effect of the landfill on human health, the consolidation of the contaminated materials into a landfill, whether the landfill be onsite or offsite, will serve to protect human health by effectively isolating the contaminants from the environment. In addition, if any water does contact the waste in the landfill, the mobility of the contaminants is so low that even if any leachate escaped the leachate collection system, the leachate should be well below any environmental or human health-based standards.

k) Comment: Commentor stated that selection of the onsite landfill is not remedying the problem but rather just moving the contaminated material from one location to another.

Response: EPA evaluated a number of alternatives in the feasibility study to determine an appropriate remedy for the site. EPA considered alternatives that would treat the contaminants, remove them to an offsite location or contain them onsite. EPA agrees that it is preferable to treat contaminated material rather than contain it without treatment. However, at the Cannelton site, treatment was not found to be effective. Therefore, the options came down to containing the material onsite or offsite. EPA agrees that moving the material offsite may not be the best solution, and decided, after assessing many factors as described above in Response i, to contain the material onsite.

2. <u>SEDIMENTS IN RIVER</u>

Several commentors disagreed with the portion of the Proposed Plan which dealt with contaminated sediments for the following reasons:

a) Comment: Commentors believed that many dynamic forces are at work in St. Marys River and that with storms, seiches, strong currents, commercial ships passing, and continuous dredging, that it is inconceivable that the sediments will stay where they are for years. Commentors believe that the shoreline is constantly changing, and that areas that are today filling in with sediments could someday experience significant erosion.

Response: EPA has taken this comment into consideration. It should be noted, however, that it is not necessary to cleanup sediments, or soils for that matter, to background chemical concentrations in order to be protective. The possibility for erosion and sediment movement will be taken into account when ultimately determining what remaining levels are protective.

b) Comment: Commentor had concern about who will be responsible for monitoring the contaminated sediment which would be left in the River under the proposed alternative.

Response: See the response to Comment 1d above.

c) Comment: The commentors expressed concern that leaving contaminated sediment in river system will not allow the most beneficial uses of that segment of the river, such as fishing, swimming, wading or drinking. Commentors believe that this seems to be a violation of the Great Lakes Water Quality Agreement which calls for cleanup to restore the beneficial uses of each Great Lake site.

Response: According to the risk assessment, recreational activities such as swimming, wading, fishing, etc. does not present unacceptable health risks due to present levels of chemicals in the sediments and surface water at the site. Surface water concentration standards under Act 245, Rule 57 would also be met in the final remedy. As a part of the remedy, the site's contribution of mercury to the river will be investigated further because of the concern over mercury levels in fish in the river. Under Superfund, the GLWQA is a To Be Considered criteria, not an ARAR. Therefore, EPA is not required to meet these requirements in a Superfund cleanup, but must certainly consider them. EPA believes most beneficial uses will be restored through removal of material and continued monitoring. The remedial action will not meet the objective of restoring to meet dredge criteria, since the dredge standards used to determine whether a sediment is polluted or not are not based on site-specific toxicity data. The remaining concentrations in the sediments will be protective.

d) Comment: Commentor expressed concern that there is disagreement between the federal and state agencies over whether

there are health threats related to the contaminants in the sediments and that the agencies should work together to determine a proper solution.

Response: EPA and the MDNR do not always agree over the appropriate cleanup at Superfund sites. The Agencies have been coordinating closely over the entire project, and will continue to do so. The MDNR has submitted new information which has affected the decisions made in the ROD. EPA believes that a proper solution has been reached which incorporates many of the concerns of the state as well as the public. Although we agree that it is desirable to have agreement on site cleanups, the final decision, assuming the remedy is in compliance with ARARs, and meets other Statutory requirements, lies with the federal government.

3. WETLANDS

a) Comment: Commentor expressed concern over the changing shoreline as it relates to leaving contamination in the wetlands.

Response: See the response to comment 2a above.

4. MDNR CONCERN OVER ALTERNATIVE 7

a) Comment: Commentor wondered why MDNR disagreed with the Proposed Cleanup Plan Alternative 7.

Response: Several letters from the MDNR lay out the reasons they disagreed with the Proposed Plan Alternative 7 (Correspondence from William Bradford to James N. Mayka dated July 2, 1992 and from Alan J. Howard to Jodi Traub, dated 9/16/92). These letters are available in the Administrative Record, which can be found at the Bayliss Public Library or the Region 5 Office. EPA responded to their concerns as found on pages 49-52 of this Responsiveness Summary.

b) Comment: Commentor recommends that EPA, MDNR and AMAX resolve the point of dispute regarding the amount of materials that constitute a human health hazard as soon as possible and get on with the cleanup.

Response: EPA intends to move to remediate this site as expeditiously as possible and agrees with this comment.

5. ALTERNATIVE CLEANUP PROPOSAL

Several commentors believed that the Proposed Plan

Alternative 7 is not a good solution to the problems at the site, that to pursue Alternative 7 would be a disservice to the community, and that an alternative solution which involves capping the site and creating a park is the best action for the following reasons:

a) Comment: One commentor believed that the health threat no longer exists and that the major contaminant, chromium, is not now leaching. He further states that all toxins are stable and that the affected groundwater and surface water are cleaner now than they have been for more than a century. The local flora, fauna and human inhabitants are healthy, and commentor opposes any plan to disturb the site, except to cap the barren zone. Commentor further suggests that environmental agencies stop wasting taxpayer's money and allow the local people to solve their own problems.

> **Response:** EPA does not agree that there is no health threat at this site. In fact, that is the primary reason that we have proposed and selected a remedial action. U.S. EPA does, however agree that the leaching potential for the waste is minimal as evidenced by the results of the RI. EPA has considered the commentors preferred remedy, but does not believe that this remedy would be protective of human health and the environment, and therefore this alternative will not be selected. First, the proposal does not adequately address the contaminated sediment in Tannery Bay or the soils in other areas of the site. EPA believes that action needs to be taken to address the elevated levels of contamination in these media. Secondly, EPA does not believe that a cap would be very effective in the Barren Zone area, particularly considering how close the Zone is to the River's edge and because of its location in the floodplain.

b) Comment: Commentor does not believe the site is a threat to the environment because any material that was soluble left the site many years ago, and that extensive analysis has established that potential leachate from the site is within established EPA standards.

> **Response:** EPA does not agree. The only EPA standards which exist for assessing leachate concentration involve the determination of whether a soil exhibits the characteristics of RCRA hazardous waste. It is true that the leach tests done indicate that the material is not characteristic. Although there appears to be minimal affect from the site on the groundwater and surface water based on the sampling conducted during the RI, some type of leach analysis or other method will be employed during the RD in order to assist the EPA in determining an appropriate cleanup level. While the current groundwater condition does not appear to

be severely impacting the surface water quality of the St. Marys River the contaminated soils may act as a continuing source. Although it does appear, based on current information, that contamination may not affect the benthic environment to a great degree, EPA still believes that the material poses a potential threat to the environment, particularly from the levels of mercury at the site.

c) Comment: Commentor believes that capping in place would cost a fraction of the EPA's least expensive remedy.

Response: EPA agrees with this comment.

d) Comment: Commentor suggests that AMAX donate the property to the City to be used as a park which would be a asset to the City and a solution that is good for the environment, the city, the neighbors and the present owners.

Response: EPA will forward this comment to AMAX.

e) Comment: Commentor supports capping of the barren zone and addition of a berm with fill in the heaviest polluted area of Tannery Bay, since digging up the areas would create more problems than proceeding with a capping approach. Commentor further believes that a park area could be established to add to the value and return the beauty of the Riverfront.

Response: EPA appreciates the view of the commentor. The State of Michigan has the discretion to allow some limited activity to occur on the surface of Solid Waste Landfills. Thus it is up to the MDNR to either accept or deny the creation of an environmental park or other such use at the site. EPA will continue to work with the community to investigate such possibilities. However, EPA and MDNR would be concerned about any activities that might be considered intrusive to the cap on the landfill.

f) Comment: Commentor believes that the action of the river, ice flows and ships have buried metals deep in the soil, and that the best solution is to work with nature to rebuild the area.

Response: EPA has detected unacceptable levels of contaminants at the site, particularly in the top two feet of soil and sediment, and believes that action needs to be taken.

g) Comment: Commentors believe pollution is not harmful since many of the former tannery workers have survived exposure.

Response: EPA conducted a risk assessment for the Cannelton site in order to assist in determining if Remedial Action is needed to protect human health and the environment.

According to this risk assessment, it was determined that there is a potential threat to human health. This is not to say that anyone exposed to the contaminants at the site will become ill or adversely affected. Rather, the risk is an estimate of the likelihood of health effects occurring to an individual within an exposed population as a result of regular exposure over a lifetime. Thus, the extended exposure of an individual to the tannery waste does not imply that adverse effects will or will not occur to that individual or that the risk estimates are inaccurate.

6. MISCELLANEOUS

Comment: Commentor believes that none of the Alternatives will have any impact on the quality of the St Marys River regardless of the money spent on the solution since there has been no new material placed on the site and any problem that may have occurred was carried away by the river in 1957 and 1958.

Response: Although there has been no new material placed, the existing contaminated soil, waste and sediment act as a potential continuing source which needs to be addressed. We will monitor to ensure that the selected remedy is protective of the River.

Comment: The fire chief commented that the fires at the tannery property had subsided since the fence was installed. The fires on the tannery property were primarily from bonfires/leaf fires that were started by individuals.

Response: EPA appreciates the fire chief's concern. EPA has made no conclusions concerning the cause of the fires. There is no conclusive evidence which supports any theory about the cause of all the fires at the site.

Comment: Several commentors appreciated EPA's efforts, believed the meeting was very informative and thought the town learned much from the meeting.

Response: Comment noted.

Comment: Commentor indicated that whatever EPA decided, he had concern that the work be done properly, without cutting any corners.

Response: EPA appreciates the Commentor's concern over the quality of the work and assures the community that the work will be done properly.

Comment: Commentor felt that having the public comment portion at the end of the night was inappropriate since many people had

already left and the media was gone.

Response: The reason that the comments are held until the later part of the meeting is so the public has the opportunity to have any questions answered before they are asked to make their formal comments. Although often these meeting are long and people must leave before the end of the meetings, EPA believes it is important that the public be informed. In addition, written comments are also accepted.

Comment: One commentor submitted a proposal to implement a new technology at the site. The technology involves incorporating contaminated soils in the production of cold asphalt as a way of reusing the material rather than taking it to a landfill. The asphalt could then be used to upgrade roads and public areas. The commentor indicated that 406,500 cubic yard of waste could be cleaned up for $20,000,000.

Response: EPA is committed to employing innovative and emerging technologies at Superfund sites and urges the commentor to contact EPA's Technology Innovation Office in Washington, D.C. to further pursue developing their technology for use at other Superfund sites. The technology the commentor is proposing has not undergone the necessary preliminary screening to determine if the technology is feasible and, therefore, it would not be appropriate to delay final selection of the remedy at this site pending further review of the technology.

Based on the information provided by the commentor, it is not clear that this technology can be used effectively for soils contaminated with metals, since it was developed as a recycling process for oil contaminated soil. Oil is a necessary component of asphalt production, while metals are not, and as such it seems that the metals would merely be bound into the asphalt mixture. A treatability study was performed by EPA to investigate another solidification technology, and this study showed that solidification did not reduce the leachability of contaminants, possibly because the leachable levels are already quite low. Furthermore, it appeared that the acceptability limits for allowable concentrations of metals in the soils prior to treatment were quite a bit lower than the levels found in the soils, wastes and sediments at the site. Although the technology does not appear appropriate or implementable for the Cannelton Industries site based on the information provided, EPA does not wish to dissuade the commentor from pursuing this technology with the MDNR as an option to be explored in the Upper Peninsula for its intended and proven use.

COMMENTS FROM THE PRPS

Conastoga-Rovers & Associates (CRA), on behalf of the property owner, Cannelton Industries, Inc., submitted three documents during the public comment period. The first document contained comments on some of the major documents prepared during the RI/FS for the Cannelton Industries site, including the Remedial Investigation Report, the Baseline Risk Assessment, the Feasibility Study and the Feasibility Study Addendum. The second document was a Baseline Risk Assessment, and the third contained a Proposed Remedial Alternative. The responses to comments will be basically organized as they were presented. The numbering system used here will be the one used in the comment document, for ease of reference.

DOCUMENT #1

In several areas within the first comment document, summaries of data, history, Superfund law and EPA guidance were presented. These were not considered comments and therefore were not summarized here and responded to. Identification of typographical errors was appreciated and acknowledged, but no response is necessary. In general, identification of other mistakes or oversights which do not significantly affect the overall interpretation of the site or the remedy selection were also noted by EPA but not responded to. Also, comments were often stated more than once throughout this document. Once a concept or issue was responded to, the comment and EPA responses were not repeated. As stated above, this comment document addressed four EPA documents: the RI, Baseline Risk Assessment (BRA), FS and FS Addendum. The comment summaries and responses will also be divided in four sections to address each document.

Comments on the Remedial Investigation Report

A.1.1.

a) Comment: The RI is incomplete in two areas: 1) it does not adequately define the potential pathways of contaminant migration, and 2) it does not provide adequate site-specific supporting data to assess the risk to the public and the environment posed by the on-site contaminants.

> **Response:** EPA disagrees with this comment, and believes that enough information was collected to adequately define site conditions and assess risks in order to develop and select a remedial action. Several specific examples of missing information are listed in the original comment; however, those will not be responded to here because the same issues are raised again and in greater detail in later portions of the comment document, where they will be summarized and addressed. The general comment that the RI

lacks the data to support the BRA and FS is made through CRA's comment document. Suffice it to say here that EPA disagrees, and only comments referring to specific areas will be addressed in the Responsiveness Summary.

A.2.1

a) Comment: References to fires in the barren zone being caused by spontaneous combustion are misleading. The cause of historic fires is most likely due to trespassers. No fires have occurred since the installation of the fence around the barren zone.

Response: EPA has made no conclusions concerning the cause of the fires. While the cause of some of the many fires at the site may have been trespassers, historical records also indicate that spontaneous combustion may have been a cause. EPA merely stated that the barren zone is reported to have spontaneously combusted. There is no conclusive evidence which supports any theory about the cause of fires at the site, and there are many opinions. It also noted that no fires have occurred since the trenches were dug, which was done about the same time as fence construction.

A.2.2

a) Comments concerning land use are addressed in the section pertaining to the Baseline Risk Assessment.

b) Comment: The barren zone is not "completely devoid" of vegetation as stated in the RI. Based on a recent site visit, it was estimated that more than 50% percent of the barren zone was vegetated.

Response: The RI states that approximately 1 acre of the tannery dump area is devoid of vegetation. It is not possible to compare this estimate with the estimate in the comment because no specific area (in sq. ft. or acres) is defined and the frames of reference may be different.

c) Comment: The summary of historical sampling events does not include the Interim Response Action Evaluation prepared by CRA on behalf of Algoma Steel in September 1989.

Response: That information was collected concurrently with the RI, therefore it does not constitute historical sampling which was available during the planning stages of the investigation.

d) Comment: The RI refers to historical groundwater sampling which indicated levels of inorganics above the MCLs, however, it is not mentioned if the samples were filtered or unfiltered, which would have a significant bearing on the assessment of these

data.

Response: Cannelton Industries and Algoma Steel were responsible for much of this groundwater sampling, and this information was not provided in the data received by EPA. Because of this lack of this information, this data was not used in the Risk Assessment.

A.3.1

a) Comment: Is RAS inorganic data available for Phase II sample locations other that HB33, HB46 and MW28?

Response: Phase II samples were collected to fill in data gaps. RAS inorganic data was not collected for all of the Phase II soil sampling locations. The purpose of the TCLP analyses was to determine whether the contaminated soils were characteristically hazardous under RCRA, not to develop a relationship between metals concentrations and leachability. The Michigan Act 307 Rules were not promulgated at the time this sampling was planned.

b) Comment: The RI report indicates that at monitoring well locations MW28, MW45, MW46 and MW47, drilling proceeded to a depth of five feet, samples were collected and boring was backfilled with a mixture of natural soils and bentonite. However, the RI also indicates that monitoring wells were installed at these locations. The RI should clarify how the soil samples were collected from the monitoring well locations.

Response: Each hand boring except MW28, MW45, MW46, and MW47 were backfilled as noted. How the soil sampling was conducted is described in Section 2.2.1.1 of the RI Report.

c) Comment: The RI states that "the duplicate tests and vacuum/pressure comparisons produce hydraulic conductivity values within the same order of magnitude...", but this statement should be revised to include that there was one exception of duplicates, MWS23S/Dup, where the results varied on one order of magnitude (MWS23S = 7.158 E + 00 ft/day and MW23S-Dup = 1.4642 E + 01 ft/day, Table 2.9 and 3.3).

Response: No revisions to the RI are being made at this time. In addition, an increase from 7.158 to 14.642 does not constitute an order of magnitude, but only a multiplication of two. Also, the data presented was for MW23I, not MW23S as stated in this comment.

d) Comment: The qualifiers on the data are unclear because sometimes the same qualifiers identify different technical problems. In addition, descriptions for several qualifiers (F,P,V) were missing from the RI report. Therefore, multiple

qualifiers add confusion, rely on the reviewer's interpretation of the qualifier's significance and require value judgments on the accuracy and the usability of individual data points in the risk assessment. More information is required detailing the precise handling and evaluation of data for use in the risk assessment.

Response: EPA agrees that this is confusing, but these are the notations that the laboratories and data reviewers are required to use. The data packages received by WW did not always specify what the particular technical problem was. The Risk Assessment described how the qualifiers were considered, and Appendix F of the RI shows how various qualifiers affect the usability of the data. Standard EPA protocol and guidance was used in interpreting the qualifiers and data usability.

A.4.1

a) Comment: Information pertaining to the 100 year Flood Plain delineation is not provided in the RI. The source of this information should be given, and the actual water level for the 100 Year Flood should be stated.

Response: The floodplain is shown on the topographical map, Figure 3.1. This information was obtained from FEMA, which is listed in the Reference section of the RI Report.

b) Comment: The commentator criticized that information concerning land and water use necessary to prepare the BRA are not provided in the RI.

Response: EPA would like to point out that since the BRA and RI should be read together, the duplication of information or effort in these documents was minimized. As such, many of the comments raised in the RI section are repeated in the BRA comments and will be addressed by the EPA in that section.

A.4.2

a) Comment: The information provided on p. 3-8, Section 3.5.2, concerning bedrock elevations at MW02, MW03 is incorrect and should be revised.

Response: The data presented in the RI properly interprets the logs in Appendix A.

b) Comment: The Bouwer and Rice equation parameters provided in Tables 2.9 and 3.3 are not reproducible, using water level (logarithmic scale) versus time (arithmetic scale) graphs, outlined in Appendix B, Volume I. It is important to understand

how these parameters were calculated so that reliable hydraulic conductivity results be established.

Response: The data for D was interpolated from the deep borings. H, as indicated in Table 3.3, was measured directly. Verification calculations can be made using the data presented in the RI.

c) Comment: The downward gradient at MW08 was reported in the RI Report as 0.11, but it should be corrected to 0.03, based on a water elevation in MW8S of 603.02 ft USGS (02/21/90) and a water elevation in MW8I of 608.38 ft USGS (02/21/90).

Response: The data that was presented in your comments was for MW3S and MW3I, not for MW8S and MW8I. Therefore, the reported gradient was correct as stated in the RI.

d) Comment: In order to calculate a site-wide groundwater discharge to the St Marys River, information should be provided for the following assumed parameters: site-wide mean hydraulic conductivity was 3.24 ft/day (would this include all units, sand, silt, gravel and sandstone). Based on the lack of information presented in the RI, the calculated velocity of 1.2 ft/day and groundwater flux of 64 gpm could not be verified.

Response: The required information to calculate the stated parameters is available in the RI. The hydraulic conductivities are given in Table 3.3 and the groundwater gradient is available from Figure 3.46 or Table 3.4. As stated in the RI, the average ground water flow velocity is 0.19 feet/day. The 1.2 ft/day velocity referenced in the comment was the approximate velocity within the gravel and cobble composite.

e) Comment: The commentor noted that for the cross-section figures, several of the screened intervals for wells were shown incorrectly.

Response: The data presented in the cross-sections are correct as listed in Appendix A. Slight variations in the location of the screen shown on the figures is possible.

A.5.1

a) Comment: In preparation of the RI data, the duplicate samples should have been averaged, rather than only using the higher value, as was done with the RI. Using the higher concentrations results in a high biased data set.

Response: The higher value was used to provide a conservative analysis. Using average values would not significantly impact the final outcome.

b) Comment: The RI does not provide a description of how field blank samples were repaired for the soils analysis. How were the field blank samples for soils prepared?

> **Response:** The field blank samples were prepared in accordance with the approved Quality Assurance Project Plan (QAPP). Only deviations from the QAPP were noted in the RI.

A.5.2

a) Comment: A sample identification key is not provided in Appendix F as stated on p. 4-2. A sample identification key should be provided which details the meaning of sample suffixes which include : S, FB, DP, DL, RE, DPDL, MS, A, B, C, D (as second suffix - ie MW03DA), and 2 (as a second suffix - ie MW19C2).

> **Response:** The sample identification key was inadvertently omitted from Appendix F. This data will be added to the administrative record. ***

b) Comment: The RI indicates that sediment and soil samples were analyzed for particle size. This data is not included in the RI.

> **Response:** The particle size data did not pass EPA quality standards due to the organic matter in the samples and therefore was not included in the RI. Reference to this should have been included in the RI.

c) Comment: Soil sample location HB09 is not listed as a soil background location in the text on p. 4-6, yet on Table 4.1 it is used as a background location.

> **Response:** The commentor was probably referring to p. 4-4, where HB09 should have been listed as a background sample. It is also listed as a background location on Table 2.7.

d) Comment: No RAS inorganic data for sampling location MW24 is presented in the RI. Were the samples collected from this location analyzed for RAS inorganics?

> **Response:** MW24 was not installed and soil samples were not collected for RAS inorganic analysis.

e) Comment: The RI states that, "Groundwater samples were collected on two separate occasions (the fall and winter of 1989).." However, for several monitoring locations such as MW20, MW21, Mw45 and others, the RI contains only one set of analytical results for VOC's semi-VOC's, pesticides, and PCB's.

> **Response:** The second round of sampling did not include organic analysis for all the wells as a cost and time saving

measure, because the first round did not show extensive organic contamination.

f) Comment: The RI indicates that monitoring wells MW21, MW2D, MW12, MW31, MW32 and MW39 were used to establish background concentrations for inorganic parameters. What monitoring locations were used to determine background concentrations for organic parameters?

Response: The same wells were used as background for organic parameters.

g) Comment: Why was MW2S not considered a background monitoring location for groundwater when MW2I and MW2D were? Based on the analytical data presented in the RI and the assessment of soils at MW2 presented in the FS, there is no justification for not including MW2S as a background location.

Response: MW02S was interpreted to be impacted by road salt due to its proximity to 4th Avenue. Inclusion of this well in the background would not significantly change the overall interpretation of the site.

h) Comment: Why is there no soil analysis for organics from MW12 or MW44?

Response: Organic analyses were performed on soils collected from MW12, and the results are in the RI. No soil samples were collected from MW44 due to an oversight in the field.

TABLES (RI SECTION 4.0)

a) Comment: Review of the data presented in Tables in Section 4.0 of the RI is difficult due to the numerous multiple qualifiers on the data, and the lack of definition with respect to the meaning of the qualifiers. Over 90 percent of the data is qualified to some degree which make interpretation of the data difficult and questionable.

Response: Qualified data does not necessarily mean that the data quality is questionable, merely that it did not meet EPA's strict standards for data quality. Also, it should be noted that when a sample has a very high concentration of one or more contaminants, or if the matrix is difficult to analyze (as in the case of tannery waste), the data will likely be qualified to a greater degree.

b) Comment: The range of background concentrations for several parameters is not included on this table even though this data is presented in Appendix F, and used to calculate cleanup criteria in the FS. For example, chromium was detected in background soil

samples at concentrations ranging from 3.4 mg/kg up to 27.3 mg/kg (FS Table I-1 pages 1 and 2). Table 4.1 indicates that chromium was not detected in background soil samples. Similarly, cadmium, calcium, copper, magnesium, nickel, sodium and zinc are listed as not*** being detected in background samples.

Response: The reason no background data was presented for these chemicals in the RI and BRA is because they were not detected above their respective quantitation limits, which is five times the maximum concentration of a chemical found in a blank sample. This is the rule of thumb for data assessment presented in Risk Assessment Guidance for Superfund (RAGS). The detected concentrations were used in the FS because no better data was available to calculate background.

A.6.1

a) Comment: In order to assess the potential for contaminant migration from the site, an understanding of the leachability of the site soils is required. The RI presents EP TOX and TCLP leaching data which gives an indication of how the site soils will react under acidic leaching conditions. The groundwater data from the site indicates that contaminants are not leaching to a significant degree. When comparing the leachate data obtained from TCLP testing to observed groundwater conditions, it is evident that the TCLP testing is not representative of in-situ site conditions.

Michigan Act 307 provides for the use of more representative leach tests to predict the leaching effects of soils on a site-specific basis. The RI did not include these representative or site-specific leaching tests and therefore, a representative assessment of the potential for contaminant migration from the soils cannot be made.

Representative leaching data are significant in preparing the FS since they determine acceptable remediation criteria and excavation estimates. Use of acid leach tests results in an overly conservative clean-up which is not based on actual site conditions, and is contrary to Michigan Act 307.

Response: The purpose of collecting EP TOX and TCLP data during the RI was to evaluate the classification of the waste under RCRA. The Michigan Act 307 rules were not promulgated at the time the sampling was planned, so the alternate objective of clean-up standard generation was not considered. The RI did make the observation that contaminants are not leaching to a significant degree, based on groundwater data. Regardless of EPA's objectives in collecting this data, EPA disagrees that using acid leach tests is contrary to Michigan Act 307, because this use of

the TCLP test is specifically stated in the Act 307 Rules, R299.5711(2)(a).

Comments on the Baseline Risk Assessment

Note to the reader: An attempt has been made to reference the location of the page or table in the Baseline Risk Assessment (BRA) on which the commentors submitted questions or concerns. However, because of the vast amount of repetition in the comments, we have not noted the source page or table for every repetition of every comment.

General Comment: Throughout the entire comment section on the Baseline Risk Assessment (BRA), the commentors claim that the site would not be developed as a residential area.

Response: EPA disagrees with this position for the following reasons:

a) Historical land use was also residential (company homes).
b) The current land use is residential. There are many adjacent homes and several of those are in areas that are zoned for "heavy industrial use".
c) The City's proposed 20-Year Master Plan includes a high density residential development in the western area of the site.
d) AMAX may not retain ownership of the property.
e) It is currently possible to build north of South Street, because all of the area is not in the wetlands or floodplains. A home could be built where the backyard, but not the home, is in the floodplain.
f) The standard of comparison is to assume residential development, and EPA has determined that residential development would not be appropriate without remediation.

In summary, it is EPA's position that it is within the realm of possibility that the site could be developed for residential use. As part of the residential scenario, it is appropriate to assume that a private well is installed for potable use.

General Comment: Throughout the comment section on the BRA, the commentors state that there should be only a trespasser scenario, not a recreational scenario.

Response: At the time the BRA was prepared, recreational use at the site was common. Although the fence currently in

place has restricted access to a significant portion of the site, recreational use of the shoreline and bay has been observed. Therefore, the term "recreational user" is an accurate description. For the purpose of the BRA, the distinction between recreational users and trespassers is semantic and will not affect the results of this risk assessment.

General Comment: Throughout the comment section on the BRA, the commentors propose dividing the site into Sectors for purposes of the BRA.

Response: There are several ways that a site can be evaluated. EPA believes that the divisions made in the existing BRA are appropriate and are a reasonable compromise between the desired detailed representation of actual conditions and needed simplicity of presentation of the assessment.

In the approved BRA, the site was divided into separate areas for background comparisons in order to assure that chemicals present at one location were not eliminated from the risk assessment based on a statistical application of site-wide data. This approach takes into account the heterogeneity of contaminant distribution in soils at the site.

EPA does not believe that dividing the site into smaller sectors for purposes of the BRA would have made any significant difference in the outcome of the risk evaluation. The important thing to keep in mind is that if an unacceptable risk is found at a site (<u>or at a part of a site</u>), ARARs are triggered for the entire site.

General Comment: Throughout the comment section on the BRA, the commentors were critical of the data qualifiers used.

Response: The qualifiers presented with the data are notations that EPA contract laboratories are required to use. Standard EPA protocol and guidance was used to interpret the data qualifiers and assess the usability of the data.

General Comment: Throughout the comment section on the BRA, the commentors have criticized the exposure assumptions used by EPA in the BRA.

Response: While many of the comments are addressed more specifically below, all assumptions have been re-reviewed by EPA and have been found to be appropriate for use at the Cannelton Site. The BRA was conducted in accordance with <u>Risk Assessment Guidance for Superfund</u> (RAGS) and other

guidance and directives available at the time. In addition, the BRA used standard default exposure factors presented in RAGS supplemental guidance. When there is no demonstrative evidence available to support changing the exposure assumptions, the standard default is used.

Comment (Title Page): "The title page of the BRA indicates that the BRA document [June 1991 (Revised October 1991)] is 'draft'. Risk management decisions must be based upon approved documents. The draft BRA cannot be utilized to formulate risk management decisions for the Site."

Response: The BRA was approved by EPA in October of 1991. The retention of 'draft' on the title page was an oversight.

Comment (page 1-4): "The BRA provides a general Site history in Section 1.2.2 which indicates that AMAX purchased the Site in 1991. The revised BRA is dated October 1991 but makes no mention of the interim remedial activities completed by AMAX in 1991. On page 1-4, the BRA states that "Access to the 'barren zone' remains unrestricted". The BRA must be revised to indicate that the security fences with appropriate warning signs were constructed in September and October of 1991. Access to the Site is effectively restricted. The text, figures and plans should be revised to identify all security fencing currently in place."

Response: For purposes of preparation of a risk assessment, access to the site is not "restricted". Fencing is considered an institutional control, which is a temporary and unenforceable measure. According to an April 22, 1991 OSWER Directive, the fact that a fence was installed in 1991 provides no justification for altering exposure assumptions. Therefore, there is no reason to update the BRA.

Comment (page 1-4): "The text indicates that the Site was proposed for the NPL in June 1988. The text does not state the current status of the proposed listing."

Response: The site was finalized on the NPL on August 30, 1990.

Comment (page 1-5): "The text identifies that there are numerous physical hazards present on Site. This statement is outside the scope of the intent of an BRA which is identified in RAGS."

Response: The presence of physical hazards on site was merely noted in the text. The extent of physical hazards at the site was in no way used in the development of carcinogenic risks and hazard indices.

Comment (page 2-3): For purposes of the risk assessment, the higher of two rounds of samples was retained for use in

development of the BRA. The commentors state that this resulted in concentrations which are biased high.

Response: Since the analytical results for a sample point are averaged with other samples on the site, the averaging of duplicate samples for one location will not contribute significantly to the overall exposure concentrations.

Comment (Table 2-1 and throughout document): Commentors contend that constituents detected in less than 5% of the total samples should be excluded from evaluation in the BRA.

Response: EPA disagrees. In the evaluation of the frequency of detection, one must consider the chemical as a candidate for elimination from the quantitative risk assessment if: (1) it is detected infrequently in one or perhaps two environmental media, (2) it is not detected in any other sampled media or at high concentrations, and (3) there is no reason to believe that the chemical may be present. The data used in the Cannelton BRA was reviewed and accepted based on these criteria. To arbitrarily set a cut-off point based on frequency of detection would have underestimated the risks present at the site.

Comment (Table 2-1 and throughout document): The commentors state that arsenic should have been deleted from the chemicals of concern in "sectors" where levels are consistent with background concentrations.

Response: EPA disagrees. The BRA evaluated the site as a whole, not in "sectors". Arsenic was retained as a chemical of concern because it was found at high concentrations significantly above background in many areas of the site and is believed to be site-related. Cleanup standards for arsenic will be based on Michigan Act 307 Type B levels or background concentrations (whichever is greater) and will be applied to the whole site. Therefore, the commentors' concern about "Sectors A, C, E and F" is inconsequential.

Comment (Table 2-2 and throughout document): The commentors argue that several contaminants should have been eliminated because they were found at low concentrations.

Response: EPA disagrees. Please see Chapter 5 of RAGS for a complete discussion of chemicals of potential concern. It is true that in Section 5.9.1 of RAGS, the text states that sometimes chemicals can be eliminated as chemicals of potential concern based upon an evaluation of both the concentration and the toxicity of the chemicals. However, the commentors provide no justification for overlooking the toxicity of the contaminants they proposed to eliminate from consideration. In addition, Section 5.9 of RAGS also very

clearly states that, "Chemicals reliably associated with site activities based on historical information generally should not be eliminated from the quantitative risk assessment, even if the results of the procedures given in this section indicate that such elimination is possible".

Comment (Table 2-2): The commentors contend that potential receptors in exposure scenarios should only be considered to be at risk of encountering surficial soils.

Response: EPA disagrees. Current populations were assumed to be exposed through recreational and residential scenarios. For current scenarios, the BRA appropriately used soil samples from the 0 to 2 foot depth interval. For future populations, soil samples for all depths were used to estimate the exposure concentrations. The use of data from soils at all depths is appropriate for future scenarios because in the construction of a home or an industrial/commercial facility, soils at depth are often brought near the surface, making them available for contact with residents and/or workers. In terms of the future recreational scenario, soils at depth are often exposed through the passage of time from both development and natural changes in land patterns.

Comment (Table 2-2): Based upon commentors' Table B.2.6, the commentors state that many metals should be eliminated as chemicals of potential concern because they were found below site related or Michigan background levels.

Response: EPA disagrees. Please see Section 2.2.1.6 and Table 2-1 of the BRA. Many inorganics were deleted from the list of potential chemicals of concern because they were found at concentrations similar to background. However, the fact that some inorganics, found at concentrations similar to background, were retained based on professional judgement is consistent with RAGS.

Comment (page 2-5 and throughout): "For purposes of comparison, the background concentrations should also be evaluated against regional background values."

Response: EPA evaluated contaminant levels against site-specific background levels, a method which is more appropriate than using national, state or even regional norms. Decisions to eliminate or retain contaminants as chemicals of potential concern were based on the guidance found in RAGS.

Comment (Overview, Chapter 3): The commentors quote from an

article (Harris and Burmaster, March 1992) enclosed as an attachment to their comments. The passages quoted from the article are critical of EPA's reasonable maximum exposure (RME) approach.

Response: EPA disagrees with the commentors and supports the use of the RME concept. The RME is defined as the highest exposure that is reasonably expected to occur at a site. The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures.

Comment (page 3-2, Section 3.1.3): The commentors again put forward their approach to develop the BRA based on the areas noted as having distinct plant communities. They argue that the distinct areas of vegetation should have distinct exposure assumptions based upon the amount of ground cover.

Response: EPA conducted the BRA for the site as a whole. The commentors justification that the type of vegetation is an important determinant of surficial soil is not supported. Under both current and future exposure scenarios, it is very likely that the existing ground cover would be either damaged or totally eliminated from activities such as dirt biking or construction.

Comment (page 3-3): The commentors state that the following calculations from page 3-3 could not be reproduced using information from the RI: "...12,300 cubic feet/day or 92,100 gallon/day (64 gallons per minute)."

Response: See the response to comment A.4.2 d in the Remedial Investigation section.

Comment (page 3-6): The commentors request that the figures be revised to identify all residences adjacent to the site.

Response: Figures will not be revised as this would not affect the results of the BRA.

Comment (page 3-6, last paragraph): The BRA states that the nearest residence is a small apartment building on South Street. The commentors state that they know of no such apartment building and ask that all figures be revised to show residences adjacent to the site.

Response: EPA has identified a residence on South Street which may or may not be an apartment building. In any event, there are individuals living in the building. The building is located immediately adjacent to the site. Figures will not be revised as this would not affect the

results of the BRA.

Comment (page 3-19 last paragraph, page 3-20, page 3-34): The commentors state that because of the absence of detectable levels of site-related chemicals in the surface water, the small area of habitat that is available for aquatic animals and the low bioaccumulation potential of chemicals of concern, the site does not have a health impact on the aquatic community. In addition, the commentors state that the potential for exposure of terrestrial animals or birds to site-related chemicals as a result of consuming aquatic organisms is also minimized. They further state that the potential impact of chemicals from the Cannelton Industries is minimal when compared to the reported impact of other polluting sources on the St. Marys River.

Response: See similar comments elsewhere in this Responsiveness Summary. Potential exposure routes involving aquatic and terrestrial organisms were not quantified in the BRA. These potential exposure routes add to the uncertainty associated with the BRA. However, EPA would like to emphasize that the risk to human health has been determined to be unacceptable, requiring Remedial Action at the site.

Comment (page 3-22): The commentors state that the analysis of a only limited number of samples for hexavalent chromium over estimated the presence of hexavalent chromium at the site.

Response: The sampling effort for hexavalent chromium was not limited, but the quality of the data limited the number of usable samples. The ratio of hexavalent chromium and total chromium was calculated for those soil samples with usable data for both analyses.

Comment (page 3-23): The commentors state that air monitoring data will serve to verify the validity of modelled concentrations.

Response: EPA will require air monitoring during the excavation portion of the Remedial Action for purposes of protecting the health of on-site workers and nearby residents. It is not planned to use air monitoring data to validate the modelled concentrations.

Comment (page 3-24 third paragraph and throughout): The commentors state that there is not enough information presented in Section 3.0 of the BRA to verify the exposure point concentrations presented in Tables 3-5 through 3-10. They further state that it is not clear which data points were used to derive the upper 95 percent confidence limit (95 percent UCL) used as the exposure point concentration.

Response: For current scenarios, the BRA used soil samples

from the 0 to 2 foot depth interval in the calculation of the 95 percent UCL. For future populations, soil samples for all depths were used to develop the 95 percent UCL.

Comment (page 3-26, 3-27 and throughout): The commentors state that an exposure frequency of 350 days per year is over conservative and unrealistic for the site considering seasonal factors.

Response: A 350 day per year exposure frequency is very conservative. Please note, however, that reducing the exposure frequency by half would still result in an unacceptable risk and an agency decision requiring action.

Comment (page 3-26, 3-27): The commentors propose exposure frequencies for a trespasser scenario.

Response: EPA does not accept the commentors' proposal. The assumptions outlined in the BRA for the recreational scenario are more appropriate to consider than those proposed by the commentors for a trespasser scenario.

Comment (page 3-26, last paragraph): The commentors challenge the assumption made in the BRA that the current adjacent residential population could potentially ingest 50 percent of their daily soil intake from the contaminated source.

Response: EPA feels that the assumption is appropriate. The commentors fail to offer an explanation as to why the assumption is not appropriate.

Comment (page 3-27): The commentors discuss a EPA recommended range for soil-to-skin adherence factors of 0.2 mg/cm^2-event to 1.5 mg/cm^2-event. They state that a value in the range of 0.2 to 1 mg/cm^2 should be used.

Response: Based upon the organic nature of the soils at the site, a soil-to-skin adherence factor of 1.45 mg/cm^2 was used.

Comment (page 3-27): The commentors disagree with the exposed surface areas estimated in the BRA. The commentors quote recent EPA guidance dated (January 1992) as justification for the use of lower values.

Response: The BRA utilized the assumptions and 50th Percentile Body Part-Specific Surface Areas presented in RAGS and maintains that the values used are appropriate for the Cannelton Site. The BRA was approved in October of 1991, prior to the issuance of the guidance quoted by the commentors.

Comment (page 3-29): The commentors disagree with the assumptions used for the showering/bathing pathway in the BRA.

> **Response:** An exposure time of 12 minutes for each showering event was used based on guidance in RAGs. The additional 10 minute inhalation exposure accounts for other activities in the bathroom subsequent to showering (e.g., brushing teeth, shaving). The EPA maintains that the assumptions used in the BRA are consistent with RAGS and appropriate for the Cannelton Site.

Comment (page 3-30): The commentors state that the inclusion of a sediment ingestion pathway for swimmers is improbable and unrealistic.

> **Response:** EPA disagrees and maintains that the pathway and its associated assumptions are appropriate for the Cannelton Site. However, we acknowledge that the ingestion of sediments during swimming will be low. The relative contribution of this pathway to the overall risks from exposure to all pathways is not significant.

Comment (page 3-30 to 3-31): The commentors challenge the assumptions made in the BRA concerning the fraction of sediments from the contaminated source that are ingested by recreational and future residential populations and current adjacent populations.

> **Response:** EPA feels that the assumptions are appropriate for the Cannelton Site. The commentors fail to offer an explanation as to why the assumptions are not appropriate.

Comment (page 3-32): "A conservative default value of 100 percent was used as the respirable fraction in the WWES BRA. For a risk assessment, particulates which are less than 10 μm in diameter or less should be considered because only these particle sized are respirable (RAGS, Section 6.6.3). Furthermore, particles which are greater than 10 μm have high settling velocities which will cause these particles to settle within a short distance after being entrained by the wind."

> **Response:** Since site-specific air monitoring data was not available, an estimate of the PM10 fraction in the air could not be made. Therefore, a conservative value of 100% was used.

Comment (page 3-32): The commentors request that the following uncertainties be added to the BRA:

- "Although arsenic is groundwater was probably not Site-related, inclusion of arsenic as a chemical of concern (3 detects in 117 samples) and using the maximum

reported concentration as the exposure point concentration resulted in a major portion of risk from residential land use."

Response: EPA disagrees. Because of the exceedingly high concentration of arsenic found at the location of the detects, it is probable that the arsenic is site-related. It would therefore have been inappropriate to eliminate arsenic as a chemical of concern solely on the basis of the number of detects. In addition, it is appropriate to assume the point of highest groundwater contamination for the location of a hypothetical well for a future residential scenario.

- "Assuming the Site was covered by 33% chromium (comparable to pure chromium salts) was totally unrealistic and over estimated risk from dust exposure by orders of magnitude."

  Response: The value used in the BRA was the maximum concentration of chromium found at the site. RAGS recommends that the 95 percent UCL be calculated in order to estimate the concentrations to be used in a risk assessment. However, if the sample variance is high when calculating the 95 percent UCL, the 95 percent UCL can end up being higher than the maximum value in the data set evaluated. Thus, the concentration of chromium used in the risk assessment defaulted to the maximum found in the data set.

- "The law [sic] probability that areas such as the floodplain and the barren zone would be used as residential should have precluded the residential scenario in these areas."

  Response: There are always uncertainties with the land use assumptions used in risk assessments. However, EPA maintains that the assumptions used in the BRA are appropriate for the Cannelton Site. Please see the response to earlier comment on this subject.

Comment (page 3-34): The commentors state that the standard ground temperature of 25°C used in the CHEMDAT7 model is too high. They claim that the standard ground temperature is 15°C and that the BRA therefore overestimated the annual emission rates.

Response: The air temperature used was a conservative assumption, but it is appropriate to evaluate short-term exposures that could occur in the summer. The air temperatures will have little impact in the results since emissions of inorganic chemicals, which are most important

at this site, do not depend on temperature.

Comment (Table 3-5, page 5-8, and throughout document): The commentors state that the use of maximum concentrations for chemicals of concern is inappropriate. As an example, the maximum detected concentration of 328,000 ppm for chromium (total) was reported at MW-19 and was used in the BRA.

Response: RAGS recommends that the 95 percent UCL be calculated in order to estimate the concentrations to be used in a risk assessment. However, if the sample variance is high when calculating the 95 percent UCL, the 95 percent UCL can end up being higher than the maximum value in the data set evaluated. Thus, the concentration to be used in the risk assessment defaults to the maximum found in the data set.

Comment (Table 3-11): "Input parameters for use in the air pathway exposure scenario are overly conservative. It is assumed that 100 percent of ambient dusts are respirable fractions. Only particles sizes 10 μm or less in diameter should be considered respirable (RAGS Section 6.6.3). In addition, future residents are assumed to remain at home, exposed to ambient dust concentrations, for 24 hours. Dust levels in the home would be much less than levels outside. The high dust levels outdoors are assumed to be equivalent to indoor levels."

Response: The 24 hour exposure time accounts for individuals who spend most of their day at home (e.g., housewives, children, invalids).

Comment (page 4-4), fourth full paragraph): The commentors propose a comparative toxicity approach for PAHs.

Response: The use of toxicity equivalency factors to adjust the PAH slope factors to benzo(a)pyrene has not yet been accepted by EPA. Until the EPA presents its own position on this subject, the approach in the BRA will remain. This approach was approved by EPA.

Comment (page 5-2, Section 5.1.2): The BRA states that chronic oral reference doses used for ingestion pathways for adults were used to extrapolate dermal toxicity values as recommended by the EPA Superfund Human Health Evaluation Manual (SPHEM). The commentors state that SPHEM does not include any discussions pertaining to the extrapolation of dermal toxicity values from oral chronic reference doses and states that there is not support for the method used in the BRA.

Response: The statement as written in the BRA is misleading since there was no extrapolation procedure used to derive dermal toxicity value from oral reference doses. The oral

reference doses were used as is to evaluate the dermal route of exposure.

Comment (page 5-7): As part of a discussion which includes several comments already addressed in this Responsiveness Summary, the commentors criticize the permeability constant for arsenic. The BRA assumed 0.0015 centimeters per hour.

Response: EPA feels that the assumption is appropriate. The commentors fail to offer an explanation as to why the assumption is not appropriate for the Cannelton Site.

Comment (page 5-20): "The WWES BRA states that the waste hides and hair are potential reservoirs of anthrax and Q-Fever spores. Firstly, there are no hides located at the Site to the best of our knowledge. CRA has conducted sampling of the most concentrated wastes at the Site and found no evidence of anthrax or Q-Fever. This information has been submitted to USEPA."

Response: Scraps of hide do exist at the site. The sampling conducted was received and reviewed by EPA and serves to alleviate EPA's concern.

Comment (Appendix B - page 1): The commentors request more details on the use of toxicity reference values.

Response: The toxicity reference values (TRVs) were used to screen analytical results for chemicals which were not detected at the site and showed high Contract Required Quantification Levels (CRQL's).

Comment (Appendix B - page 2): The commentors question the skin surface area and other assumptions assumed per exposure event for the calculation of TRVs.

Response: Because the TRVs are used as a screening step, the most conservative assumptions were used. The use of TRVs provides a better understanding of the uncertainties associated with the contaminant detection levels but does <u>not</u> affect the outcome of the actual risk calculations in the BRA.

Comment (Appendix B - page 3): The commentors criticize the surface water assumptions used.

Response: The 7 days/year of swimming and ingestion of 50 mL of water per hour are assumptions recommended by RAGS. The 2.6 hours estimated per event is appropriate for the Cannelton Site. These assumptions taken together are certainly not overly-conservative.

Comment (Table B-1): "In deriving the TRV values for total

chromium, the reference dose for chromium VI is used. To assume that the total chromium is all hexavalent chromium is a conservative approach and will over-estimate the problem at the Site. This will result in TRV values which are more stringent."

Response: The TRVs were used to screen analytical results for chemicals which were not detected at the site and showed high CRQL's.

Comment (page D-2, first bullet): The commentors take issue with a statement that says that there is no vegetative cover on the barren zone. They claim that approximately 50% of the barren zone is vegetated.

Response: It is true that there is some vegetation within the fence area surrounding the barren zone. An accurate determination of the vegetated area would be difficult because of the thin and patchy character of the vegetative cover. However, we believe that more than half of the area within the fence is barren. The debris, and larger particles in portions of the barren area probably have little impact on erosion.

Comment (page D-2 third bullet, page D-3): "The third bullet point states that the universal soil loss equation was used to calculate total suspended particulate (TSP) rather than PM-10. This was done by dropping the factor k=0.5, the estimated factor of TSP which is PM-10, from the soil loss equation." The commentors go on to state that, because only particles less than 10 μm in diameter should be considered, the 0.5 factor in the soil loss equation should be retained so that only PM-10 particulate emissions are calculated.

Response: Data on the size fractions of the material in the barren zone were not available. Therefore it was assumed that all of the material that eroded was respirable.

Comment (page D-3, first and fifth bullets): The commentors disagree with the erodibility estimated for the barren zone. They claim that approximately 50% of the barren zone materials consist of materials greater than 0.8 mm and have estimated the soil erodibility to be 38 tons/acre/year. They also propose to change the vegetative cover factor to 0.5 from 1.0.

Response: The material in the barren zone is not soil. It is very similar to sphagnum peat in size and texture. It is also very subject to wind erosion because of its low density. None of the soils listed in Control of Fugitive Dust Sources were very similar to the material in the barren zone. It was assumed that the soil erodibility factor for loamy sand was appropriate because this was, of the soils listed in Control of Open Fugitive Dust Sources, the most

similar to peat. The particle size of the material in the barren zone will probably decrease as the material degrades and is exposed to physical forces such as wind, freezing, thawing, etc. The soil erodibility factor used was appropriate given the characteristics of the material and the lack of definitive information.

Comment (page D-3, fourth bullet): The commentors disagree with the calculation of the unsheltered field width factor and maintain that there is no break in the tree barrier along the eastern fenceline of the barren zone.

Response: There is a small break in the trees east of the barren zone. The trees that exist along this edge are not as closely spaced as stated in the comment. Also, these are mostly deciduous trees, so the influence of the tree barrier will be less when the leaves are not present. The reduction in the distance protected by the trees is appropriate for these reasons.

Comment (page D-3): The commentors propose a revised emission rate for PM-10 emissions from the barren zone.

Response: The analysis presented in the comment may or may not be appropriate; there are no data to support these assumptions. The selection of more conservative assumptions for the analysis in the risk assessment is appropriate given the lack of information on erosion of the material in the barren zone.

Comment (page D-4, first sentence): The commentors disagree with the use of maximum concentrations over the entire Disposal and Plant area. They propose to divide the Disposal and Plant area into areas of concern with varying maximum concentrations or 'hotspots'.

Response: The CHEMDAT7 model used <u>reasonable</u> maximum exposure concentrations, which are calculated as the 95 percent UCL of the arithmetic mean. When the calculation of a 95 percent UCL lead to a value greater than the maximum detected, the maximum concentration was used. The CHEMDAT7 model as performed in the BRA was sufficient to provide the information needed.

Comment (page D-6): "BOXMOD output for the barren zone indicates that the pollutant type selected was a 'gas'. This should be 'particulate' since the barren zone emissions being modelled were from windblown particulate matter. The model should be rerun to verify the effect of this unrealistic assumption."

Response: The use of the "gas" option rather than the "particulate" option in the BOXMOD model input was a

conservative assumption made in the absence of any information regarding the particle size, density, and settling velocity of the material in the barren zone.

Comment (Appendix F, page 1): The commentors propose to use the most recent oral slope factor for benzo(a)pyrene.

Response: The BRA was approved in October of 1991. The more recent slope factor was presented in the Health Effects Assessment Summary Tables released in March 1992. The BRA will not be revised. However, to the extent that this new toxicity information changes the cleanup standard for carcinogenic PAHs, as calculated in accordance with Michigan Act 307, this new slope factor will be considered.

Comments on the Feasibility Study

C.1.1

a) Comment: Details explaining the calculation of "contaminant-specific, risk based, maximum acceptable concentrations" (Tables 1.1 through 1.4) are not provided in the BRA or FS.

Response: The risk-based concentrations were determined using the scenarios and assumptions provided in the BRA.

C.1.2

a) Comment: Tables 1.1 through 1.4 should be revised to indicate the risk levels which were used to calculate the various concentrations. Do these concentrations represent acceptable risk based concentrations for a 10^{-6} risk level for carcinogens and a hazard index of 1.0 for non-carcinogens?

Response: Yes. This is stated on p. 1-9 of the FS, where these tables are referenced.

C.2.1

a) Comment: Michigan Type B Soil Cleanup Standards are not appropriate sediment cleanup criteria. Use of the Type B soils cleanup criteria is an inappropriate and improper use of the Michigan Act 307 rules.

Response: There are no MDNR promulgated Act 307 criteria for sediment. In lieu of specific criteria for sediment, it is reasonable to apply soil criteria to this medium. In the FS, a Type B methodology was used to determine criteria for chromium in sediment by using a leach test model with the available TCLP data. The FS Addendum attempted to use sediment toxicity studies to develop cleanup criteria.

Ultimately, any sediment criteria would be considered a Type C cleanup under the Act 307 Rules.

b) Comment: The commentor takes issue with the fact that RCRA Subtitle C and Land Disposal Restrictions are presented in the ARARs section of the FS and has discussed at length why these regulations are not ARARs.

Response: The ARARs presented in this section of the FS are potential ARARs. Whether RCRA Subtitle C is ultimately an ARAR depends on whether the waste at the site meet the requirements. It should be obvious in the FS that RCRA Subtitle C was not considered an ARAR since it was not used in the development of any remedial action components, such as waste handling, treatment or landfill construction. It is not listed as an ARAR in this ROD.

c) Comment: A Type C cleanup also satisfies the requirements of Michigan Act 307. However, the discussion of Act 307 as an ARAR in the FS virtually ignores the Type C alternative. It should be known that the clear position of the MDNR is that there is no inherent institutional preference for any of the three cleanup options. Each of the three cleanup options (Types A, B or C) is to be considered equally acceptable for satisfaction of the Michigan 307 requirements.

Response: The Type C option was not ignored in the FS, but was considered at the time to be a more action-specific approach involving containment of wastes rather than removal of all material to Type A/B levels. Alternatives 2, 4 and 6, which evaluated on-site consolidation and containment and capping in-place are Type C options. For the reasons outlined in the FS, MDNR has predominantly relied on a Type A/B cleanup approach. Evaluation of Type C remedial options is not a requirement of any Act 307 remediation but is dependent on site specific factors as to whether such a remedial approach would satisfy the nine criteria of CERCLA. Evaluation of a Type B option is required by the Rules. It should be noted that the vast majority of MDNR approved site closures performed to date have relied significantly on Type A/B remedial options. Furthermore, the FS Addendum, which is intended to be read together with the FS, evaluates a Type C remedial action with "Type C" chemical-specific criteria.

d) Comment: Commentor states that Michigan rules implementing Type C criteria do not require compliance with Rule 57, and that the prohibition of the mixing zone is not incorporated either.

Response: While the Michigan Act 307 Rules do not specifically address compliance with Rule 57 limits for Type C remedial actions, the rules do not imply that the required

level of protectiveness of surface water is any less under a Type C remedial approach. A mixing zone was incorporated into the assessment of a Type C approach for protection of surface water. However, it should be noted that the MDNR has made it clear in their comments that applying a mixing zone in calculating cleanup criteria is not acceptable.

e) Comment: Commentor states the EPA may waive ARARs pursuant to Section 121 of CERCLA.

Response: The commentor is correct in stating that EPA may, if appropriate, waive ARARs pursuant to Section 121(d)(4) of CERCLA.

f) Comment: Commentor states that MCLs and MCLGs are not Applicable and may not be ARARs. If they are ARARs commentor believes these should be waived for various reasons.

Response: EPA agrees that MCLs and MCLGs are not applicable requirements, since the groundwater at the site is not a municipal supply servicing more than 25 persons. EPA disagrees with the Commentor's statement that a waiver of MCLs and MCLGs is appropriate. The groundwater could be suitable for use as a source of drinking water in the future. Contrary to Commentor's statement that compliance with MCLs would be measured at the site boundary, the point of compliance is at and beyond the waste management boundary, which at the Cannelton site will be at the edge of the capped containment area. This means that ARARs would not necessarily have to be achieved beneath the onsite landfill. EPA disagrees that MCLs and MCLGs should be waived based on technical impracticability. There is no technical basis provided for this comment.

EPA disagrees with commentors position that there are institutional and locational constraints preventing the potential future use of the groundwater as a source of drinking water. Although the site and other areas may have been used as industrial property in the past, there are residences and a school very close to the site and it is reasonable to assume that this property could be used for purposes other than industrial in the future. Commentor cites Act 368 which deals with the issue of installation of wells in the area of floodplains. MDNR has stated that this is not an ARAR. While zoning provisions may contain restrictions on how the site can be used, there is nothing to prevent the zoning provisions from changing in the future. Regarding the fact that Cannelton owns the property, there is nothing to preclude them from selling the property in the future. For these reasons, EPA disagrees that MCLs and MCLGs are not well suited to the release. Regarding secondary standards, the Commentor is correct in stating that these are TBC requirements, to the extent that

they are not more stringent state ARARs.

g) **Comment:** Commentor states that no mixing zone applies to Type C remedies.

Response: See response to Comment C.2.1.D above. EPA used a model which included a mixing zone to help determine whether current levels of particular contaminants would be protective of surface water or not, but not necessarily to establish Type C cleanup levels.

h) **Comment:** Commentor states that Michigan Act 245 Part 22 are not ARARs based on a memo from J. Traub dated 6/25/92 to A. Howard.

Response: The Part 22 rules of MI Act 245 are not ARARs for the Remedial Action selected for the Cannelton Site.

C.3.0

a) **Comment:** Commentor stated that no Type C cleanup option was evaluated in the FS.

Response: Commentor is incorrect in stating that no Type C Cleanup was evaluated in the FS. Alternative 2, 4 and 6 are Type C options since levels above Type A/B standards are left on-site. The EPA also evaluated another Type C approach to cleanup and documented this in the FS addendum.

C.3.2

a) **Comment:** Commentor stated the EPA should evaluate risk reduction for various remedial actions or partial remedial actions, and that future use of groundwater at the site is not a reasonably likely assumption.

Response: EPA does not believe it to be necessary to evaluate a Type A, B, and C groundwater remedy for each alternative. EPA has evaluated a "Type C" groundwater remedy as part of its proposed plan, Alternative 7. EPA expects that Type B levels will eventually no longer be exceeded in the aquifer once remedial action is completed. EPA does not normally, and has not evaluated the risk reduction due to fencing or other institutional control type of options if these are not believed to be protective remedies.

b) **Comment:** Commentor states that data has not shown that groundwater has degraded surface water or sediments and thus that containment of the contaminants will not accomplish the objective to prevent degradation of these media, and that contaminants are not significantly leaching.

Response: The FS considered Type A/B criteria. Although EPA agrees that there appears to be minimal groundwater impact, construction of a hydraulic barrier is not an extensive response action considering that there still are some areas where groundwater has been impacted significantly by contaminated soils.

c) Comment: Commentor states that the FS fails to evaluate data in the RI to calculate appropriate Type B levels, that contaminants are not leaching significantly and that using 20x the drinking water standard is not representative of in situ conditions.

Response: EPA did evaluate TCLP data from the RI to generate soil cleanup levels. However, no valid correlation was demonstrated between the soil and leachate data. EPA agrees that Act 307 allows for either the use of 20x drinking water values or a site specific leachate analysis in addressing potential impacts of soils on groundwater. EPA further agrees that a variety of alternate leach tests, other than the EP tox and TCLP analysis conducted in the RI could be applicable to this site.

d) Comment: Commentor requested that more representative, site specific leachate tests be performed as part of the RD.

Response: Further leachate studies, or other appropriate studies, are planned during the RD.

e) Comment: Michigan Act 307 DHC levels would not apply to soils at depth.

Response: Under a Type A/B cleanup, the rules state that Type B criteria must be achieved at every location at the site. The MDNR has interpreted this to mean at any depth in the soil column.

f) Comment: PAHs do not leach as is indicated in R 299.5711, and the number of samples collected and analyzed during the RI is inadequate to determine background concentrations. PAHs would be expected to occur naturally in an old industrial area.

Response: The quote referencing R 299.5711 is incorrect, although EPA agrees that PAHs do not readily leach. EPA will consider taking additional samples to define background during the RD. EPA does not agree that PAHs occur naturally in industrial areas, although these may be common contaminants in industrial settings. The data used in the FS were obtained from the DNR, and took into account the limited leachability of PAHs.

g) **Comment:** Commentor does not believe that Type A criteria for chromium in soils was based on good science.

> **Response:** The determination of this criteria was consistent with the Administrative Rules of Michigan's Act 307 and the available data at the time.

h) **Comment:** Commentor states that cleanup level for lead should be greater than 1,000 ppm and that either typical background for arsenic or 80 ppm, based on a residential scenario should be used instead of the numbers derived in the FS for Type A scenario.

> **Response:** Recent MDNR guidance indicates that while 400 ppm would be considered acceptable based on direct human contact, groundwater protection must still be considered. It does not appear that the 1000 ppm level considers protection of groundwater. EPA believes the level calculated under the 307 rules for Arsenic is appropriate as a Type A level. See earlier discussion in the section on the Baseline Risk Assessment.

i) **Comment:** The assumption that all leachate from the sediments is hexavalent chromium is overly conservative, since hexavalent is soluble, and would not likely be present given the age of the contaminants and mixing in the River.

> **Response:** This approach is consistent with EPA and MDNR guidance regarding chromium in the absence of species-specific information. The data collected in July 1992 was not available during preparation of the FS, but will be considered during the RD. Again, the purpose of the FS was to develop an array of alternatives that met the 307 rules. The criteria were developed based on the data at hand. The 307 rules allow for development of criteria based on leach tests.

j) **Comment:** The level of effort for sampling and assessment for chromium in sediments was inadequate.

> **Response:** Although four samples were utilized to derive the chromium response level, many more samples were collected and used to identify areas requiring remediation. Obviously, the volumes stated in the FS are not absolutely required to be removed. Rather, based on the available data, these estimates were made of the volume that would need to be removed to achieve cleanup levels. In remediation only that volume necessary to meet cleanup levels will be removed. Additional sampling can be done to more precisely define the extent of the removal.

a) Comment: Commentor states that FS failed to evaluate a Type B using site specific data, failed to evaluate a Type C cleanup, overestimated the volume for removal, and is overly conservative.

> **Response:** Site specific leaching data were reviewed in preparation of the FS. It was determined that the relationship between contaminant leachate concentrations and soil concentrations are strongly dependent upon the soil type as well as concentration. EPA agrees that as part of the RD work, additional leachate samples may be taken. The data available at the time of FS preparation does not show a statistically significant leachate relationship that is consistent across the site due to the lack of leachate data below Act 307 Type B groundwater standards. The volumes for removal were based on all contaminants, not just hexavalent Chromium. The volumes estimated in the FS are accurate based on the cleanup objectives and corresponding response levels. See also other related responses.

b) Comment: Commentor wonders how sediment erosion can be prevented.

> **Response:** Proper engineering controls will effectively minimize sediment erosion.

c) Comment: Commentor believes that restoration of the site to background is not appropriate, that the cleanup level for chromium should be impact based, that the groundwater analysis would provide a representative estimate of the leachability based on insitu conditions, and that site specific data should be used to estimate the cleanup level.

> **Response:** Under the Type A/B approach, remediation is required to the higher of background or the most restrictive Type B criteria. Act 307 does not allow for impact based approach under Type A/B. Act 307 Type A/B does not allow explicitly for use of groundwater data to assess the leachability from soils. EPA agrees that cleanup to background levels is not necessary. Further leachate studies may be conducted in the RD.

d) Comment: Commentor believes that since groundwater at the site currently meets both hex and trivalent chromium drinking water standards, that no remedial action is required to meet the groundwater standards.

> **Response:** Where useable groundwater is present beneath a site, Act 307 Type B requires that regardless of the current state of groundwater, soils be remediated to 20x groundwater standards or an alternate level based on site specific leach tests to ensure prevention of future impacts to groundwater. EPA agrees that there is minimal groundwater contamination

and as such has not selected an active pump and treat remedy for the groundwater. However, EPA would like to point out that chromium is not the only contaminant at the site and other chemicals, such as As and Cd, do exceed drinking water standards.

e) Comment: Commentor believes the area calculated in zone E is incorrect.

Response: It is correct, since in several instances the deeper excavation covers a larger area than the shallower.

f) Comment: The need for remedial action based on the leaching of contaminants from soils in Zone A, C, and E is unsupported. Data in the RI indicates that VOCs are not present at levels which are of concern. Site specific leaching data should be used to determine cleanup levels.

Response: EPA agrees that additional leachate tests may be done during the RD.

g) **Comment:** Commentor states that the FS does not demonstrate an understanding of the physical requirements for sediment removal or the effects of such a removal.

Response: Excavation via dragline and slurry pump is not considered innovative technology. The FS addendum considers the effects of these actions.

C.4.0

a) Comment: Commentor questioned why the cost of a wetlands specialist was delineated.

Response: Upon review, EPA agrees that this cost may not be an appropriate inclusion in the estimate.

b) Comment: The number of verification samples is excessive and EPA should consider a larger grid and fewer parameters.

Response: These estimates were developed in accordance with the established Act 307 verification procedures for excavations. Other verification sampling programs will be considered during the RD.

<u>Comments on the FS Addendum</u>

D.1.1

a) Comment: The commentor quotes a section from the FS Addendum which describes how Type B soil standards are derived which are protective of groundwater by using either a 20 times the Type A

or B groundwater standard for soils or by performing a TCLP test to determine appropriate soil contaminant concentrations. The commentor then states that in light of this option, the FS Addendum still uses 20 times groundwater to determine soil cleanup levels.

Response: The groundwater number used to calculate some soil criteria in the FS Addendum was not the Type A or B groundwater criteria, but was a backcalculated groundwater number generated in a groundwater-surface water model, which assumed a mixing zone. 20 times this backcalculated number, rather than some other arbitrary factor not supported by available data, was deemed appropriately conservative, considering the less conservative approach taken in the model. Furthermore, it has been stated by EPA in the FS and in this Responsiveness Summary that a leaching model to generate cleanup standards would be an acceptable alternative under Act 307. However, it is unlikely that MDNR would support comparing the leachate concentration to the backcalculated groundwater values derived in the model. The cleanup criteria used in the FS and FS Addendum are sufficient for evaluation of remedial alternatives. It is further noted that this groundwater model was not used to develop soil standards in the ROD.

b) Comment: The TCLP data presented in the RI is sufficient to develop appropriate cleanup standards based on leaching factors.

Response: EPA does not agree. The leachate data developed during the RI did not show any statistically significant relationship between contaminant concentrations in soil and leachate. The leachate data used to develop leaching factors in the comments (Appendix C.1) excluded low concentration soil samples. Development of leachate-based soil cleanup criteria should be done using all the data. Additional leachate testing which shows a statistically significant relationship between contaminant concentrations in soils and leachate and is representative of all the soils types present at the site would be appropriate to develop cleanup standards.

c) Comment: Current groundwater quality is protective of surface water and sediments and the remedial action objective to protect surface water and sediments from degradation resulting from migration of contaminated groundwater off site has been accomplished. Based on the existing groundwater data, no soil removal from the site would be required, based on impacts to the St. Marys River.

Response: While the current groundwater condition does not appear to be severely impacting the surface water quality of the St. Marys River, the contaminated soils act as a source

of continuing contamination which should be addressed in order to reduce the potential for future impacts. The fact that the detection limit used for mercury was significantly above the surface water standard makes it difficult to assess the impact mercury in soils and groundwater may be having on the surface water. The presence of a contaminant such as arsenic in the groundwater at an extremely high level further supports the need for some source control action. For these reasons, the remedial action objective to protect surface water and sediments from degradation due to groundwater discharges is appropriate.

d) Comment: The Direct Human Contact (DHC) standards presented in Michigan Act 307 are based on unrestricted residential land use. The future use of the site as residential is not likely, and site-specific risk assessment standards should be used.

Response: As stated earlier in the BRA section, EPA disagrees that residential use is not a possibility and believes that this scenario is appropriate for cleanup standard development and conforms to EPA and MDNR policy.

e) Comment: The commentor objects to several of the cleanup standards derived for Alternative 7, including PAHs, lead, chromium, mercury and arsenic.

Response: EPA disagrees and believes that the criteria developed are sound and are based on current EPA and MDNR policy for deriving cleanup standards which are protective of human health. Criteria are typically applied to the entire soil column and do not account for vegetative cover, in order to appropriately protect human health if land use or conditions change in the future. EPA acknowledges that the air modelling developed for the BRA is quite conservative, which is one of the reasons that a less conservative exposure scenario, current residential, was selected for derivation of chromium cleanup criteria rather than a more restrictive scenario. For arsenic, EPA believes the approach taken is appropriate, and site-specific background cleanup standards, which supersede "typical" or "regional" background levels, should be used whenever available.

f) Comment: The commentor states that the cleanup objectives for the sediments and the resulting decisions made based on these objectives are not supported. These objectives include protecting the environment from adverse effects due to the presence of site-related chemical contamination, protecting human health from direct contact, minimizing resuspension of sediments and water column contamination and improving aquatic habitats. The commentor states that there is no evidence of adverse effects, use of Act 307 DHCs is not representative, dredging

would result in greater resuspension of sediments than any natural occurrence, aquatic habitats have not been shown to be degraded, and given the fact that Alternative 7 proposes that water from dewatering activities for sediments would be discharged to the river, sediments cannot be impacting surface water to a level which would require sediment removal in the first place.

Response: The rationale which supports remediation based on these cleanup standards is very clearly presented in the FS Addendum. In summary, it does appear based on current information that contamination may not affect the benthic environment to a great degree. However, this objective is still appropriate if additional information shows otherwise. The contaminants along the shore are available for direct human contact, therefore Act 307 DHC soil criteria must be considered. With appropriate engineering controls, the short-term effects of dredging sediment can be minimized. The investigation performed by EPA's Environmental Response Team (ERT) did show that the physical habitat of hide material and hairballs appeared to stress the benthic communities. For the dewatering operation, collected water would only be discharged to the river if it met appropriate discharge requirements.

g) **Comment:** The quantities of soils and sediments estimated for remediation are overestimated based on inappropriate selection and application of cleanup criteria for PAHs, lead and arsenic.

Response: The arguments presented by the commentor have already been addressed earlier in this Responsiveness Summary. EPA believes that cleanup standards have been selected and applied according to Act 307 and EPA and MDNR policy and guidance.

DOCUMENT #2

This document submitted by CRA was a revised Baseline Risk Assessment.

Response: While EPA has read and considered the submitted Risk Assessment (RA), EPA will not be providing detailed comments but an overall response. EPA notes that the preparation of a revised risk assessment is not a comment as such, since it does not directly comment on any document EPA has prepared or the recommended remedy. CRA's RA indirectly comments on EPA's BRA, in that it incorporates the results of CRA's criticism of the BRA into the development of its own RA. As part of this Responsiveness Summary, EPA has responded to, and in many instances disagreed with, CRA's comments on EPA's BRA. Therefore, EPA will not repeat its responses to these comments here, although many directly

apply to CRA's RA submittal. EPA disagrees with the commentor on several key issues, such as potential future land and water use and the role of a fence in risk reduction, and therefore cannot condone or agree with the risk assessment provided by CRA. CRA deviates from the typical application of EPA and MDNR guidance and policy in the development of this risk assessment. Furthermore, it is reiterated here that the RA is used to determine whether an action is necessary at a site. Once an action is deemed necessary, ARARs are triggered. These ARARs apply to the whole site, not just to the specific area which may have triggered the action by driving the risk.

DOCUMENT #3

This document consisted of a new proposed alternative, called Alternative 3B.

Response: Again, while the EPA has read and considered the proposed remedial alternative, it does not agree with the proposal. For the reasons stated above under Document #2, EPA will not respond in detail nor comment on this document. EPA will address broad issues which are key in development of the proposed alternative.

1) EPA agrees that further leachate studies may better characterize actual site conditions in order to determine levels of contaminants in soil which will be protective of groundwater and surface water. EPA does not agree with the way the existing leachate data was evaluated and applied by the commentor, as has been stated in the section concerning comments on the FS.

2) EPA notes that the results of any leachate studies should be applied to soils across the site, not just to select areas. Taking an impact based approach may not take into account the potential for soils to leach. In addition, EPA believes that the approach and analysis used to determine which areas require remediation was flawed (e.g., comparing mercury concentrations in surface water detected using low detection limits against a background groundwater level which 1) was detected using a significantly higher detection limit, and 2) may be associated with blank contamination and is therefore questionable). Using the data in this way, one cannot draw the conclusion that since mercury was elevated in background groundwater samples above surface water detects, there is no impact from the site. Furthermore, not enough groundwater data exists in the Tannery Point area to say with certainty that groundwater has not been impacted there and is not impacting surface water.

3) While EPA agrees that destruction of wetland habitat and

potential resuspension of sediments due to dredging are factors that should be considered when developing a remedial alternative and weighing the pros and cons under the nine criteria, EPA does not agree that these factors are adequate rationale not to take an action when one is deemed necessary. To the extent that these areas are an actual or potential threat to human health and the environment, they must be remediated.

4) EPA believes that the site should be cleaned up to levels which would not preclude future residential development of the area. Levels developed based on the Risk Assessment submitted as a public comment are not appropriate. EPA agrees that sampling for background levels of PAHs may be appropriate and will consider conducting such sampling during design.

COMMENTS FROM OTHER FEDERAL AND STATE AGENCIES

Responses to Michigan Department of Natural Resources Comments:

Comment: The Michigan Department of Natural Resources had several concerns with the EPA Proposed Plan Alternative 7.

a) MDNR stated that Alternative 7 did not satisfy Rules 601, 705(1), 717(2)(a) and (b), and 717(5)(a), (b), (e), (f), (k), and (l).

Response: EPA disagrees. The remedial actions and cleanup standards selected for this site are in compliance with the State identified ARAR since they have been selected in accordance with CERCLA and the NCP. For a more detailed analysis of Act 307 and its implementing regulations as an ARAR for Superfund sites, see the document in the Administrative Record titled "Michigan Act 307 and the Superfund Process" and the ARARs section in the ROD.

b) MDNR stated that the use of a mixing zone for a nonpoint source in Alternative 7 is inconsistent with the Binational Program and is not allowed under the Part 4 Rules promulgated under Michigan Water Resources Commission Act, 1929 PA 245.

Response: EPA has agreed to not use the mixing zone concept as had been described in the Proposed Plan. EPA has considered the results of the model in its determination that the current levels of chromium, lead and mercury may not be protective of the environment, and that additional studies would be conducted to ensure protection of the environment.

c) MDNR wants to derive sediment cleanup standards based on mercury and chromium concentrations in the sediment pore water

such that the leachate could not exceed Michigan Act 245 Rule 57 standards.

Response: EPA has agreed to conduct additional leachate tests or other appropriate studies in order to determine an appropriate cleanup level in the sediment to ensure that the sediments are not contributing contamination to the surface such that Act 245 Rule 57 water quality standards are exceeded. This is particularly important because there is a mercury problem in the River, including a fish advisory in the River and throughout the Great Lakes. In addition, mercury bioaccumulates strongly, so that benthic organisms which live in the sediment and ingest the water could be a source of mercury to the food chain. Cleanup standards will be adjusted based on these studies after consideration of background conditions in the River. For chromium, EPA determined that even under present conditions, chromium was detected in surface water above Rule 57 standards only 4 times out of 24 onsite samples, filtered and unfiltered. Chromium has also not been shown, based on the RI/FS, to be a causative factor of toxicity in the tests performed to date. Chromium is also not known to bioaccumulate, which may cause it to be of less concern than mercury. Nevertheless, EPA agrees that additional leachate sampling or other appropriate studies will be conducted on chromium and other contaminants of concern in the sediments.

d) MDNR wants to use a leaching model, as allowed under a Type B cleanup to ensure that remaining soil concentrations will be protective of surface water, i.e., such that leachate levels would not exceed Rule 57 standards.

Response: The data collected during the RI indicated that there is minimal leaching into the groundwater from the soils. For chromium, only one well which monitors groundwater leaving the site had a detection above the surface water criteria, even given the very high levels of chromium which presently exist in the soils. However, EPA will comply with the requirements laid out in Act 307 Rule 299.5713 as these relate to protection of surface water.

e) MDNR believes that if the soil cleanup standards are derived and applied as mentioned above, that there would be no need for additional ecological toxicity studies and that a natural wetland would be allowed to regenerate.

Response: EPA notes MDNR's position on the need for additional ecological toxicity testing.

f) MDNR believes that low level mercury sampling must be done in order to develop defensible sediment cleanup criteria.

Response: EPA agrees that it may be necessary to use a low detection limit for mercury to determine if the levels present at the site pose a threat to the environment and to assist in the determination of the appropriate extent of cleanup for mercury.

g) MDNR stated that the Binational Program to Restore and Protect Lake Superior specifies that the State and EPA initiate sediment remediation measures at AOCs known to contribute persistent bioaccumulative substances to the Lake Superior ecosystem. They also believe that the objectives of the Great Lakes Water Quality Agreement would not be met since the objectives of zero discharge and restoration to beneficial use would not be met by the cleanup proposed.

Response: EPA has selected a remedial action which addresses the sediment at the Cannelton site. EPA agrees that additional studies need to be conducted to determine the appropriate cleanup level for mercury. EPA has considered both the beneficial use objectives of the GLWQA and the zero discharge goal of the Binational Program. As for the beneficial use objective, EPA believes that we are restoring beneficial uses through removal of material or continued monitoring. EPA is not planning to meet the objective of restoring to dredge criteria, since the standards used to determine whether a sediment is polluted or not are not based on site-specific toxicity data, are not health based and are not believed to be appropriate. In addition, the sediments contaminated by the site are not likely to be dredged for navigational purposes, based on the realities of the site. The zero discharge goal does not take into account the regulatory realities of the Superfund law such as the nine criteria and requirement to select a cost-effective remedy. Nevertheless, it is expected that surface water standards will be met prior to groundwater discharge, and mercury will be further assessed. Both of these programs are not ARARs, but are considered in our decision making process.

h) MDNR believes it is preferable to reestablish the wetlands and shoreline contours only to the extent necessary to stabilize the lakeshore, assuming the leachate-based cleanup approach is used.

Response: EPA notes this comment.

i) MDNR does not believe the costs for long term monitoring have been adequately considered.

Response: EPA disagrees. The FS was conducted consistent with Agency guidance and regulations and considered the long term O&M costs in its determination of the net present worth

of the remedy.

j) MDNR believes that if post removal monitoring indicates that groundwater contaminant concentrations exceed water quality standards at the groundwater/surface water interface, a groundwater remedy should be triggered.

Response: EPA disagrees. If it is determined that the remedial action is not effective in reducing the contaminant levels in groundwater even further, and that surface water criteria are not being met, EPA will need to revisit its decision. An assessment of the effectiveness of the remedy will be conducted as a part of the 5 year review, which will be required at the site.

k) MDNR cannot support the onsite landfill since alternative treatment technologies (specifically vitrification) have not been considered, there may not be adequate space to construct the landfill and still meet the requirements of Act 641, and on onsite landfill would make surrounding lands less desirable for development.

Response: EPA looked at vitrification and determined that it would not be cost-effective to select this technology at the Cannelton site because of the large volume of material to be treated and the expense of this technology. The landfill will be designed and constructed in compliance with the substantive requirements of Act 641. If there is not adequate space to construct the landfill, EPA will need to reevaluate its decision. EPA has addressed the remaining issues from this comment in earlier sections of the Responsiveness Summary.

Responses to U.S. Fish and Wildlife Service Comments:

These comments were presented in a letter from Charles Wooley of the U.S. Fish and Wildlife Service (U.S. FWS) to Mary Beth Novy, U.S. EPA dated July 20, 1992. While this letter discussed comments on the draft Proposed Plan, U.S. FWS requested that the letter be placed in the Administrative Record, and EPA believes it is appropriate to respond to their concerns.

Comment 1: The U.S. Fish and Wildlife Service (U.S. FWS) was concerned that the highest concentration of chromium was not tested using toxicity tests or an evaluation of the benthic macroinvertebrate community.

Response: This is not accurate. The information presented in the U.S. FWS memo is from the RI. Due to the same concerns stated in the U.S. FWS memo, the Region V Biological Technical Assistance Group (BTAG) suggested that a subsequent study be conducted. This subsequent study

included toxicity testing with three species, Chironomus riparius, Hyallella azteca, and Selenastrum capricornutum. Soil toxicity tests were conducted using Eisenia andrei. Benthic macroinvertebrate community evaluations were conducted in the locations of sediment collection for toxicity testing. The results of these studies did not indicate a correlation with test response and chromium concentrations in the soils or sediments even with the highest concentrations.

Comment 2: The U.S. FWS expressed concern that comparisons of total metals may correlate with toxicity test responses more than only chromium.

Response: A formal evaluation of the total metals was not done, and a full TAL metal scan was not conducted in the subsequent study. However, chromium was found to be the dominant metal present, especially in the areas of highest contamination and, therefore, a ranking of sampling locations by total metals should be similar to a ranking by chromium (particularly at the high and low chromium concentrations). We, therefore, believe that a formal correlation evaluation of total metal to toxicity test response would yield the same conclusion as the evaluation with chromium only.

Comment 3: The commentors state that hexavalent chromium concentration data should be used rather than total chromium for comparisons.

Response: EPA concurs that hexavalent chromium is the more hazardous form of chromium and, therefore, evaluation of hexavalent chromium was attempted. However, the determination of hexavalent chromium is problematic, at best, and the data generated could not be evaluated. Investigations of hexavalent chromium levels in the RI indicated that substantial levels of this form of chromium were primarily associated with the areas proposed by EPA for remediation. It is, therefore, felt that the environmental threat due to hexavalent chromium has, effectively, been evaluated.

Comment 4: U.S. FWS maintains that food chain bioaccumulation should have been directly evaluated.

Response: The current literature on chromium effects suggest that chromium is a threat as a direct toxin, not as a food chain or bioaccumulation threat. Evaluation of the terrestrial and aquatic communities present at the Site have not indicated that there has been a loss of expected wildlife community members or a reduction in numbers. We recognize that presence does not preclude threat, however,

based upon the period of time that the Site has existed, the presence of the community currently utilizing the Site as a habitat and the proposed remediation, it is believed that unacceptable residual threats to wildlife will not exist. However, due to concerns for bioaccumulation threats, particularly for mercury, additional studies have been proposed to insure that unacceptable environmental threats do not exist at the Site after Site remediation.

Comment 5: U.S. FWS suggests a review of U.S. FWS and NOAA documents on chromium effects.

Response: These documents have been reviewed and utilized in the subsequent environmental assessment studies.

Comment 6: U.S. FWS expressed concern about the potential effects of debris and fill material.

Response: The physical influence of tannery waste material as well as non-site related debris, primarily lumber scrap and waste, has been considered. The evaluation of this physical threat has influenced the remedial effort with Tannery Bay, supporting the removal of tannery waste material from the shoreline and Tannery Bay.

Comment 7: U.S. FWS contends that the wetland present at the Site can not be of high quality.

Response: The U.S. EPA concurs that under ideal conditions habitat of any form should be devoid of foreign material and concentrations of compounds or elements exceeding background levels. We also recognize that the wetlands which are typical of the St. Marys River are dominated by bulrush. Our contention that the wetlands currently present at the Site are of "high quality" is based upon their apparent functioning and utilization (including year-round resident species). The wetlands at the Site are unique in the area, containing some bulrush as well as cattail dominated areas but is primarily a wooded wetland. Additionally, the diversity of woody species as well as the age and size of the woody species provides a wide range of habitat types. Therefore, our conclusion that the wetlands present are of high quality is based upon the diversity of species observed, the diversity of habitats present and the observed utilization of the area by wildlife.

COPY

ADMINISTRATIVE RECORD INDEX
CANNELTON INDUSTRIES TANNERY SITE
REMOVAL ACTION
SAULT STE. MARIE, MICHIGAN

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
1		00/00/00	Phone call re: waste quantity at the site is unknown, the site is not secured, and drinking water for Sault Ste. Marie is supplied from a surface water intake.	Jerry Goode-Ecology & Environment	Earl Olsen-MDNR	Communication Record	
1		85/02/07	Phone call re: Private domestic wells are found within a three-mile radius of the site.	Jerry Goode-Ecology & Environment	Bob Schelling-MDNR	Communication Record	
1		85/05/29	Phone call re: explanation of how the waste quantity for the site was arrived at along with a report of the site being unsecured.	Jerry Goode-Ecology & Environment	Diane Roycraft-MDNR	Communication Record	
1		87/03/04	Report of private wells in the vicinity of the site.	Jerry Goode-Ecology & Environment		Communication Record	
1		88/06/07	Record of phone call from Sault Ste. Marie fire Chief reporting a fire at the site and suspected contamination.	S.Harrington-MDNR		Communication Record	
2		86/01/21	Review of findings in the 1/86 report "Work Plan, Tannery Property" submitted by Algoma Steel.	Cletus Courchaine-MDPH	Richard Johns-MDNR	Correspondence	
10		87/11/18	The MDNR's Environmental Response Division Marquette District staff opinion that the hazards posed to the public by this site are quite high and have requested funds for interim response measures under Act 307, P.A. of 1982. It is requested of the MDPH that they determine whether	Frank Opolka-MDNR	Larry Chadzynski-MDPH	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			a human health risk indeed exists at the site.				
	17	87/11/18	Sample data and related information concerning the old Northwestern Leather Company disposal site. Author requests that the MDPH determine whether a human health threat exists at the site.	Frank Opolka-MDNR	Larry Chadzynski-MDPH	Correspondence	
	2	88/05/23	Letter suggesting that there may be tannery waste influence on the groundwater.	John Erickson-MDPH	R.Leflar-Sault Ste.Marie	Correspondence	
	2	88/05/24	State of Michigan lab for metal samples collected on 3/25/88 from the 14th Street spring. Letter covering results states that the results for chromium is probably quite significant.	John Erickson-MDPH	R.Leflar-Sault Ste. Marie	Correspondence	
	1	88/06/07	Request for the installation of a fence at the site due to the toxic nature of the material at the site, the extreme hazard of self-combustion and a complete lack of access restriction..	Mark Petrie-MDNR	Peter Weithercut-USEPA	Correspondence	
	7	88/06/22	Concern is expressed with the current condition of the site. Author also contends that the site fires are biological in nature. Also, arrangements have been made to secure the site with a fence. Attached is a copy of the analytical results on water samples taken by the U.S.Geological Survey.	F.L.Craig-Algoma Steel	Nicholas Longo-USEPA	Correspondence	

ADMINISTRATIVE RECORD INDEX
CANNELTON INDUSTRIES TANNERY SITE
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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBR
	4	88/06/28	Special Notice of Potential Liability.	Mary Gade-USEPA	See service list	Correspondence	
	2	88/08/04	Explanation of and rationale behind of USEPA actions to circumvent the underground burning.	Nicholas Longo-USEPA	F.L.Craig-Algoma Steel	Correspondence	
	11	88/09/22	Letter transmitting documentation from city files on the site. Letter also offers the opinion that site fires will re-occur, causing evacuation and relocation of city residents.	C.M.Bouth-City of Sault Ste.Marie	Steve Harrington-MDNR	Correspondence	
	1	80/08/26	Results of samples taken at the site on 7/10/80.	Elwin Evans-MDNR	D.Mulcahey-Bliss -MDNR	Memorandum	
	2	86/01/16	Problems and questions that the author has with the 1/86 report "Work Plan for Cannelton Industries 307 Site, Chippewa County".	Mark Petrie-MDNR	Robert Scneling-MDNR	Memorandum	
	2	86/02/26	Review of report dated 1/86 containing the preliminary findings on the site and submitted by Algoma Steel.	Dianna Roycraft-MDNR	Robert Scneling-MDNR	Memorandum	
	2	88/05/12	Health Risk Assessment.	Lawrence Chadzynski-MDPH	Frank Opolka-MDNR	Memorandum	
	2	88/05/12	Health Risk Assessment for Cannalton Industries Tannery Disposal.	Lawrence Chadzynski-MDPH	Frank Opolka-MDNR	Memorandum	
	4	88/06/16	Handwritten memo giving status of the site as of 6/16/88. Attached are memos on sampling by the MDNR on 6/14/88 and a map of where those samples were collected.	Mark Petrie-MDNR	MDNR	Memorandum	

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CANNELTON INDUSTRIES TANNERY SITE
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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBE
	6	88/09/06	ACTION MEMORANDUM - Request for Removal Action at the Cannelton Industries Site, Sault Ste. Marie, Michigan.	Nicholas Longo-USEPA	Basil Constantelos-USEPA	Memorandum	
	24	89/04/03	ACTION MEMORANDUM: Request for Exemption to (the) Twelve-month Statutory Limit and Project Ceiling Increase for the Cannelton Industries Removel Site, Sault Ste. Marie, Michigan.	Ralph Dollhoph-USEPA	Basil Constantelos-USEPA	Memorandum	
	20	00/00/00	Water well records.			Other	
	2	00/00/00	Site Description/Executive Summary.	S.Harrington-MDNR		Reports/Studies	
	9	78/08/11	Biological Survey of the St. Mary's River.	David Kanaga-MDNR	MDNR	Reports/Studies	
	8	79/00/00	Chromium in the St. Mary's River in the Vicinity of the Old North Western Leather Company at Sault Ste. Marie, Michigan.	David Kanaga-MDNR	MDNR	Reports/Studies	
	4	84/07/03	Preliminary Assessment.	Diane Roncraft-MDNR	USEPA	Reports/Studies	
	15	86/01/09	Work Plan - Tannery Property, Cannelton Industries, Inc. Sault Ste. Marie, Michigan. With cover letter.	F.L. Craig - Algoma Steel	R.Schneling II-MDNR	Reports/Studies	
	19	86/08/00	Study - Tannery Property Cannelton Industries, Inc. Sault Ste. Marie, Michigan.	Algoma Steel Corp.		Reports/Studies	
	25	86/09/23	Inspection Report For Cannelton Industries.	CH2M Hill	USEPA	Reports/Studies	
	6	88/06/00	POLREPS number 1 through 4.	Nicholas Longo-USEPA	USEPA	Reports/Studies	
	62	88/06/10	Weston Spec Division Hazardous Waste SIte Investigation And	S.Subasukumar-Weston Spec	USEPA	Reports/Studies	

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	2	88/06/27	Sampling Plan.	Evans & Springer-Roy F. Weston,Inc.	Nicholas Longo-USEPA	Reports/Studies	
	3	88/07/20	Three proposed options and plans of action for the berming and flooding of the site.	Weston-Sper FAF	Steve Faryan-USEPA	Reports/Studies	
	19	88/09/30	DRAFT Site Assessment And Sampling Action For Cannalton Industries Sault Ste. Marie, Michigan.	Springer&Cisneros-Roy F. Weston,Inc	Steve Faryan-USEPA	Reports/Studies	
	57	87/11/18	Results of analyses of ground water from the well installed at the tannery this past summer.	Denise Dunouchelle-U.S.DOI	Fraser Craig-Algoma Steel	Sampling/Data	
	7	88/04/27	Analytical results from the U.S.Geological Service well on the site.	P.L.Craig-Algoma Steel	S.Harrington-MDN R	Sampling/Data	
	58	88/06/12	Analysis of 6 water and 14 soil samples for cyanide, chromium,cadmium,zinc,lead, mercury,PCB's as well as EPA method 624 priority pollutant compounds.	Richard Rediske-EDI Eng. & Science	Paul Gauthier-MDNR	Sampling/Data	
	6	88/06/21	Analytical Report - Samples P-1 and P-3.	Wadsworth/Alert Laboratories, Inc.	Paul Williams-Maztech	Sampling/Data	
	17	88/07/14	Data Synnaries recieved from the MDNR, a rough map of the site, and a letter from Mark Petrie of the MDNR to Peter Niethercut of the USEPA requesting the installation of a fence at the site.	Mark Petrie-MDNR	Nick Longo-USEPA	Sampling/Data	
	16	88/07/18	Sample results for sample no's. 1-4A - 1-12A, 2-4B - 2-15B, 3-4C,3-5C.3-9C, 3-10C, 4-4D,4-5D,4-9D,4-10D, 5-4E,5-10E, and six samples	F.Mc Laughlin-Analy.& Bio Labs,Inc.	Kefauver-PEI Assoc.	Sampling/Data	

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	8	88/07/20	Analytical results from sample no. 14400.	P.Mc Laughlin-Analy.&Bio.Labs,Inc	Kefauver-PEI Assoc.	Sampling/Data	

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